
equiflex

NRT 114 F031/F041: Heating controllers

User's Manual

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Im Surinam 55
CH - 4016 Basel
www.sauter-controls.com

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Symbols used in this manual



Information

Information concerning the use of the product.



Warnings



Factory settings of the EQJW 125 (e.g. control values, switching times etc. specified by the manufacturer)

The operating instructions give a step-by-step explanation of the individual functions of the device, with the help of the following symbols:



'PROG' is shown on the display, flashing

'09:00' is shown on the display, not flashing



Press key...



Display in automatic mode. This display is the starting point for the steps explained here (except for 'Commissioning' and 'Active manual mode').

20.3°C the measured room temperature

09:00 current time (09:00 hrs)

Mi current weekday (Wednesday)

1 temperature level 1

⊖ automatic mode as per weekly switching programme

If necessary, the display can be reached by pressing the MENU/ESC button once or several times (except when manual mode is active). If, during programming, the buttons are not pressed for longer than about 2 minutes, the controller returns to the previous function automatically (except when manual mode is active).

1 General information

1.1 Introduction

The Equiflex NRT 114 is a compact outside-temperature-led or room-temperature-led heating controller with switched outputs for room-temperature and/or supply-temperature control. In automatic mode, it reduces the room temperature during the night (reduced temperature with temperature level 1) by carrying out switching commands from the week time-switch (weekly switching programme); it switches to the normal temperature (level 2) during the day and raises it in the evening to the 'comfort' temperature (level 3). It is suitable for all types of building. A fixed basic programme (factory setting) ensures that the controller can be put into operation easily and quickly in most installations. If necessary, it can be adapted to the particular heating system by using the SERVice parameters. The automatic change-over from summertime to wintertime and vice-versa frees the users from having to correct the time twice a year. If the heating controller is fitted in living quarters, it can also be used as a remote-control unit with room-temperature connection; but it can also be used without room-temperature connection elsewhere.

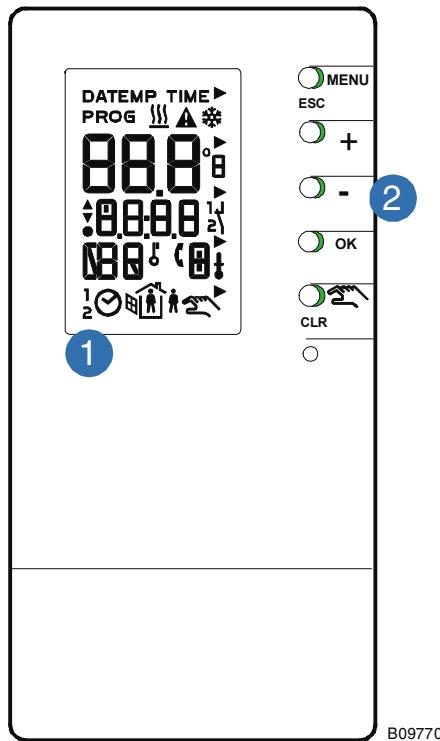
1.2 Safety instructions



Particular care is required in order to avoid injury, fire or damage to the unit. Please read these unit operating instructions after the equipment has been installed by a specialist in accordance with the fitting instructions (MV505760 or MV505761) enclosed with the unit. Please read these instructions in order to learn how to operate the controller. Observe local regulations when installing the controller. The controller is not a safety-related component. The frost-protection function (or the 'Limitation of supply temperature' function) does not replace the relevant safety facilities.

2 Description of the operating elements

2.1 Front view of the NRT 114



B09770

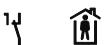
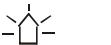
Fig. 1: NRT 114 – Front view

- ① Display
- ② Buttons

2.2 LCD

The display shows the status of the installation, the room temperature, the switching programme etc.

- Button function is active
- ☰ Heating requirement
- ❄ Frost protection active
- ▲ Warning or error message or control model 0 has been chosen
- 88.8 ° Actual value or setpoint for the temperature shown in °C or °F
- ▲ ▼ Triac opens or closes the valve
- Relay for pump/pilot timer is closed
- 8.8.8 Time (hours : minutes)
- 🔒 Button (keypad) lock is active

	'Absence' function is active
	'Presence' function is active
	'Window function' is active
	'Telephone remote control' function is active
	'Fault in installation' function is active
	'Central keypad lock' function is active
	'Flow limitation' function is active
	Temperature levels or the installation on stand-by or the installation OFF (see Section 4.2.2)
	Figreviation for weekday or a period of time
	Automatic mode as per weekly (1) and annual (2) switching programmes
	(Un)limited temperature change or manual mode
	Floor-drying function (operational heating) is active

2.3 Keypad

The buttons (or keys) enable the controller to be operated.

Explanation of button functions

 MENU ESC	Access to the menu levels for setting date, time, switching programme, temperature levels and manual mode. Return to the previous menu level or to the automatic mode. Abort functions.
 +	Scroll in the menu. Increase the flashing value. View the setpoint for the room temperature.
 -	Scroll in the menu. Reduce the flashing value. View the setpoint for the room temperature.
 OK	Confirm the flashing value. Access to a lower menu level. Access to the SERViCe mode.
 CLR	Call up the '(un)limited temperature change' function. Delete switching commands.
	Reset button

3 Operation

3.1 Commissioning

When commissioning the NRT 114, there are some general settings that are a necessary pre-requisite for the running of the NRT 114. The NRT 114 should be commissioned when the controller is connected to the power supply for the very first time. Depending on the application, further settings need to be changed thereafter. When commissioning the NRT 114, the following three steps should be carried out:-

- Set language
- Set time and date
- Select control model

3.1.1 Set language

The NRT 114 shows the day of the week in abbreviated form (e.g. MO = Monday). For this, one of the following languages has to be set first:-

D = German

E = English

SP = Spanish

F = French

I = Italian

CS = Czech

For countries with other languages, there is a numerical code available for showing the day of the week. Each day is indicated by a number as follows:-

1 = Monday

4 = Thursday

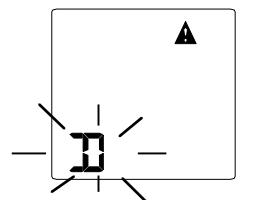
7 = Sunday

2 = Tuesday

5 = Friday

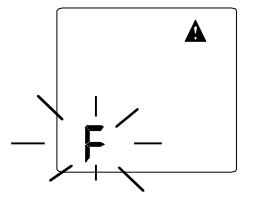
3 = Wednesday

6 = Saturday



(+/-)

Choose a language



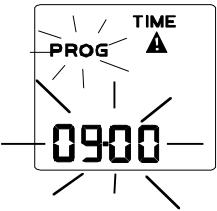
(OK)

Confirm the selected language and save (F= French in this case)

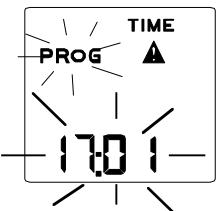


The language can be easily changed at any time using the SERVice parameters (see Section 3.2.5).

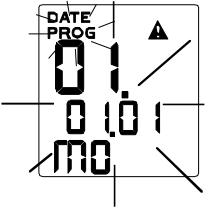
3.1.2 Set time and date



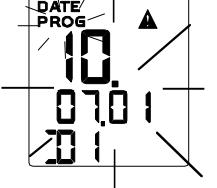
(+/-) ▶ Change time



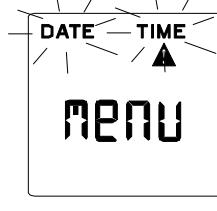
<OK> ▶ Confirm time (17:01 hrs in this case)



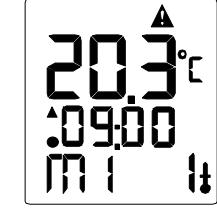
(+/-) ▶ Change the date.
The day, the month and the year must concur with the current date.
The weekday is updated automatically.



<OK> ▶ Confirm date (10th July 2001 in this case)



<ESC> ▶ Call up automatic mode



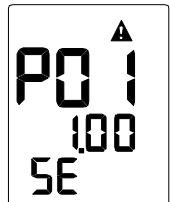
▶ Automatic mode is shown.
A warning is shown on the display, since no control model has been chosen yet.

3.1.3 Select control model



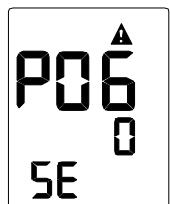
⟨OK⟩
⟨Esc⟩
⟨OK⟩

- ▶ should be pressed for longer than 4 seconds, then with
- ▶ and
- ▶ in SERVice mode, choose



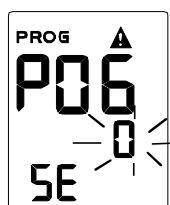
⟨+⟩ ⟨-⟩

- ▶ SERVice parameter P06 (the parameter is used to set the control model)



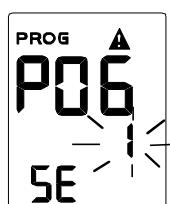
⟨OK⟩

- ▶ Call up SERVice parameter



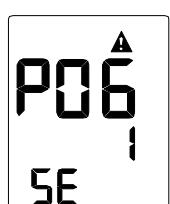
⟨+⟩ ⟨-⟩

- ▶ Change the SERVice parameter



⟨OK⟩

- ▶ Confirm the SERVice parameter (1 = weather-compensating supply-temperature control in this case)



⟨Esc⟩

- ▶ Return to automatic mode



- ▶ Display in automatic mode

3.2 SERvice-Mode

In SERvice mode, a technician can adapt the NRT 114's basic setting to the installation and fulfil specific requirements. Please also observe the fitting instructions (MV505760 or 505761) supplied with the NRT 114.

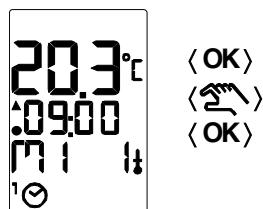


Heating controller is parameterised (set) incorrectly

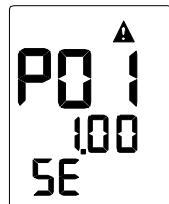
Considerable damage may be caused to the installation and/or persons may be at risk of injury.

- ▶ The SERvice mode should be activated only by a technician.

3.2.1 Access to SERvice mode



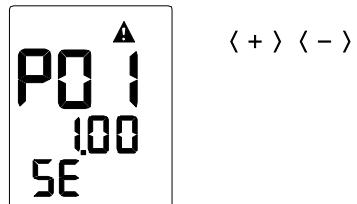
- ▶ Should be pressed for longer than 4 seconds, then with
- ▶ and
- ▶ go to SERvice level



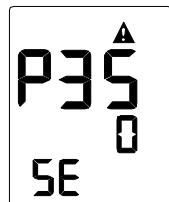
- ▶ Display in SERvice mode

Explanations:
P01 Number of SERvice parameter
1.00 Value of SERvice parameter
SE SERvice mode

3.2.2 View SERvice parameter

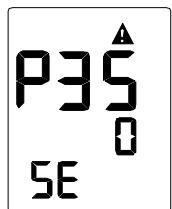


- ▶ Scroll through SERvice parameters



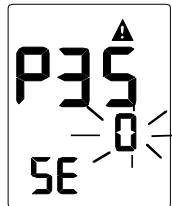
- ▶ View each SERvice parameter (parameter P35 in this case)

3.2.3 Change SERVice parameters



⟨ OK ⟩

- ▶ Call up the chosen SERVice parameter so that the value can be changed.



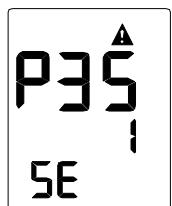
⟨ + ⟩ ⟨ - ⟩

- ▶ Change the value of the SERVice parameter.



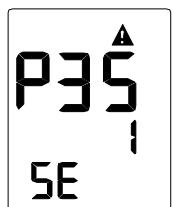
⟨ OK ⟩

- ▶ Confirm new value for SERVice parameter.



- ▶ Value has been changed and will be adopted on returning to automatic mode.

3.2.4 Return to automatic mode



⟨ ESC ⟩

- ▶ Return to automatic mode.



- ▶ Display in automatic mode.

3.2.5 List of SERVice parameters

Number		Description	Range	Step size
P01	0Y.xx	Software version (Y = 1: Series version, xx = Serial number)	-	-
P02	0	Current device status <ul style="list-style-type: none">▪ 0 = OK; fault coding, see Section 3.2.6	0...8191	1
P03	0	Unused	0...1	1
P04	0	Software reset <ul style="list-style-type: none">▪ 0 = Function not active▪ 1 = Reset SERVice parameters (Sauter or OEM factory setting)▪ 2 = Reset switching programmes (Sauter factory setting)▪ 3 = Reset SERVice parameters (Sauter or OEM factory setting) and reset switching programmes (Sauter factory setting) The parameter is then reset to 0.	0...3	1
P05	0	Menu for manual mode <ul style="list-style-type: none">▪ 0 = manual mode not enabled 5...100: manual mode enabled with a maximum valve opening from 5...100%	0...100	5
P06	0	Control model MOD <ul style="list-style-type: none">▪ 0 = control not active (contacts open)▪ 1 = outside-temperature-led PI supply-temperature controller▪ 2 = PI room-temperature controller▪ 3 = room-temperature-led P+ PI supply-temperature controller (cascade)	0...3	1
P07	0	Language <ul style="list-style-type: none">▪ 0 = German 1 = French 2 = English▪ 3 = Italian 4 = Spanish 5 = Czech▪ 6 = 1...7	0...6	1
P08	0	Unit for temperature shown <ul style="list-style-type: none">▪ 0 = °C 1 = °F	0...1	1
P09	0	Actual temperature in automatic mode <ul style="list-style-type: none">▪ 0 = room temperature▪ 1 = outside temperature unattenuated for MOD1 (see P06)▪ 2 = supply temperature for MOD1, 3 (see P06)▪ 3 = return temperature for MOD1, 3 (see P06) if corresponding sensor type was parameterised (P12:3, 4, 5)	0...3	1
P10	8	Minimum limitation, setting range, room temperature's setpoint TRmin	8°C ...36°C	1K

Number		Description	Range	Step size
P11	38	Maximum limitation, setting range, room temperature's setpoint TRmax <ul style="list-style-type: none"> ▪ 10...40°C when values are measured using internal NTC sensor ▪ 10...70°C when values are measured using Ni1000 sensor (P12:1) 	10°C...40 (70)°C	1K
P12	0	Measurement of room and return temperatures:- <ul style="list-style-type: none"> ▪ 0 = measurement of room temperature using internal NTC sensor ▪ 1 = measurement of room temperature using external Ni1000 sensor ▪ 2 = internal NTC and external Ni1000 measurement of room temp. with averaging ▪ 3 = measurement of return temperature using external Ni1000 sensor for maximum limitation of the return temperature and binary input FLim for minimum flow limitation ▪ 4 = limitation of the return temperature by external Ni1000 sensor for minimum limitation of the return temperature to protect a boiler ▪ 5 = limitation of the return temperature by external Ni1000 sensor for minimum limitation of the return temperature to protect a heating surface ▪ 6 = Connection for EGS 52/15 or EGT 333 remote-control unit 	0...6	1
P13	0.0	Influence of wall when room temperature is measured with internal NTC sensor	-6.0K...+6.0K	0.1K
P14	0.0	Influence of wall when room temperature is measured with external Ni1000 sensor	-6.0K...+6.0K	0.1K
P15	0	Measurement of outside temperature for MOD 1 (see P06) <ul style="list-style-type: none"> ▪ 0 = Ni1000 ▪ 1 = 0...10 V also requires the jumper to be transposed (see MV505760 or MV505761) 	0...1	1
P16	3	Steps for setting the damping of the outside temperature (MOD 1) <ul style="list-style-type: none"> ▪ Level 0 = undamped to level 10 = damped with a time constant of 24 hours 	0...10	1
P17	0	PROG input function (see also table in Section 3.2.6) <ul style="list-style-type: none"> ▪ 0 = absence ▪ 1 = presence ▪ 2 = window contacts ▪ 3 = remote switching ▪ 4 = fault indication ▪ 5 = keys disabled ▪ 6 = fixed-value control 	0...6	1

Number		Description	Range	Step size
P18	0	Direction of operation for PROG input <ul style="list-style-type: none"> ■ 0 = active closed ■ 1 = active open 	0...1	1
P19	2.0	2 K P-band, P controller for MOD 3 (see P06)	1.0K...20.0K	0.1K
P20	40	40 K P-band PI-controller	2K...100K	1K
P21	240	240 seconds integral action time, PI-controller	15s...6000s	5s
P22	120	120 seconds valve running time	30s...300s	5s
P23	5	5°C minimum limitation, supply temperature for MOD 1, 3 (see P06)	0°C...100°C	5K
P24	75	75°C maximum limitation, supply temperature for MOD 1, 3 (see P06)	20°C...130°C	5K
P25	90	90°C limitation of return temperature for MOD 1, 3 (see P06)	0°C...90°C	5K
P26	2	2 K/K level of intervention on reaching the return temperature's limit for MOD 1, 3 (see P06, P12)	– 10K/K...10K/K	1K/K
P27	60	60°C supply setpoint for T4 (fixed-value control) for MOD1, 3 (see P06, P17)	0°C...130°C	5K
P28	0	Room-temperature connection for MOD 1 (see P06, P12) <ul style="list-style-type: none"> ■ 0 = not active 1 = active when TRi > TRs ■ 2 = active when TRi < TRs ■ 3 = active when TRi < > TRs 	0...3	1
P29	1.4	1.4 slope for heating characteristic for MOD1	0.0...5.0	0.1
P30	1	Frost-protection <ul style="list-style-type: none"> ■ 0 = not active ■ 1 = active 	0...1	1
P31	1	Function of relay output (Figreviations: PT = pilot timer.; pump = CP) <ul style="list-style-type: none"> ■ 0 = Relay has no function ■ 1 = CP for heating ■ 2 = CP for fixed-value control ■ 3 = PT controlled by weekly and calendar programmes ■ 4 = as 3 but taking PROG input into account ■ 5 = as 4 but also taking into account the (un)limited temperature change 	0...5	1
P32	0	Anti-jamming function for valves and pumps <ul style="list-style-type: none"> ■ 0 = not active ■ 1 = active at triac outputs (valve) ■ 2 = active at relay output (pump) ■ 3 = active at relay and triac outputs (pump and valve) 	0...3	1

Number		Description	Range	Step size
P33	120	120 min 'off-time' for pump at beginning of a temperature reduction in MOD1 Requirement: room-temperature connection not active (P28:0)	0 min...900 min	10min
P34	0	Display of / [10 Std.] total duration of closed relay contacts (cannot be deleted)	0...9999	1
P35	0	Calendar programme <ul style="list-style-type: none"> ▪ 0 = not active ▪ 1 = active, switching commands remain in memory after execution but are no longer taken into account ▪ 2 = active, switching commands will be deleted after execution ▪ 3 = active, switching commands will be adopted for next year after execution 	0...3	1
P36	10.25	25 th October, summer/winter time-change	00.01...12.31	00.01
P37	03.25	25 th March, winter/summer time-change. When P36 = P37: no summer/winter or winter/summer time-change	00.01...12.31	00.01
P38	66.3	Display of supply temperature's actual value, e.g. 66.3°C for MOD 1, 3 (see P06)	– 1.0°C...140.5°C	0.1K
P39	69.7	Display of supply temperature's setpoint, e.g. 69.7°C for MOD 1, 3 (see P06)	– 1.0°C...140.5°C	0.1K
P40	16.0	Display of damped outside temperature, e.g. -16.0°C for MOD1 (see P06)	– 49.9°C...49.9°C	0.1K
P41	33.4	Display of return temperature's actual value e.g. 33.4°C for MOD 1, 3 (see P06, P12)	– 1.0°C...140.5°C	0.1K
P60	0	Floor-drying function <ul style="list-style-type: none"> ▪ 0 = not active ▪ 1 = active ▪ 9 (read only) = successfully concluded 	0...1	1

Tab. 1: SERVice parameters

3.2.6 Explanations of certain SERVice parameters

P01 Display software version
The controller's software version number is shown.

P02 Display device status
The device status of the NRT 114 is read with the aid of SERVice parameters 2. The value 0 denotes that the NRT 114 functions correctly. Faults are coded as follows:-

▪ Reading error in EEPROM	1
▪ Writing error in EEPROM	2
▪ Short circuit in internal room sensor NTC	4
▪ Open circuit in internal room sensor NTC	8
▪ Short circuit in external room sensor Ni1000	16
▪ Open circuit in external room sensor Ni1000 or return-temperature sensor	32
▪ Short circuit in supply-temperature sensor Ni1000	64
▪ Open circuit in supply-temperature sensor Ni1000	128
▪ Short circuit in outside sensor Ni1000	256
▪ Open circuit in outside sensor Ni1000	512
▪ Valve was opened with 5-fold valve running time	1024
▪ Valve was closed with 2-fold valve running time	2048

If several faults occur at the same time, the value for the SERVice parameter is derived from the sum of coded numbers. When the fault has been rectified, the value for the SERVice parameter is automatically reset.

If there is a read or write error in the EEPROM, it is advisable to switch off the controller's power supply briefly. The NRT 114 then restarts. If the fault still occurs, consult a heating specialist.

If, due to the prevailing control deviation, the valve was opened with more than five times its running time or closed with more than double its running time, this is indicated in the status register by the error number 1024 or 2048. The controller's operation is unaffected by this. The error number in the status register is deleted whenever an opening or closing pulse is issued in the opposite direction.

P04 Software reset
Switching commands and/or SERVice parameters are reset to the factory settings. The value of the SERVice parameter should be changed and confirmed. The NRT 114 then carries out the relevant reset and assigns a value of 0 to the parameter.

P05

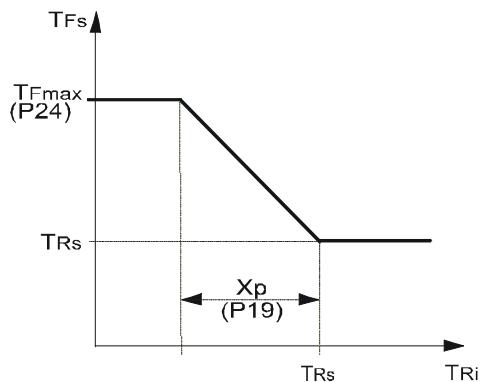
Manual mode

The manual mode disabled/enabled by SERVice parameter P05. If the value of the parameter is 0, manual mode is disabled and not accessible via the menu. If the parameter is given a value greater than 0, the manual mode can be activated via the menu. Using the value for the parameter, the maximum percentage valve opening can be set at the same time; this can be set via the menu for manual mode. If, for instance, a value of 55 is set, the valve can be opened no more than 55% via manual mode. The valve opening is calculated via the valve running time.

P06

Control model

SERVice parameter P06 is used to set the control model. The factory setting for the value of the parameter is 0, i.e. the relay and thyristor outputs are without power. Control is not effected with this setting. If the parameter has a value of 1, weather-compensating supply-temperature control is effected. If the parameter is given a value of 2, room-temperature control is effected; with a value of 3, room-temperature-led supply-temperature control is effected (cascade control). For cascade control, the correlation between the flow temperature's setpoint and the deviation from the room temperature is portrayed in the diagram on the right.



B10969

Fig. 2: Control model

P07

Language

There is a choice of languages. The weekday is shown in the chosen language.

P08

Unit of indicated temperature

The temperature indicated on the display can be shown in either °C or °F.

P09

Indication of temperature in automatic mode

It is possible to choose between different temperatures that are shown in the display in automatic mode.

P10, P11 Maximum limitation setting range room temperature's setpoint
The maximum setpoint for the room temperature can be varied only within certain limits. These limits can be set within a range using SERVice parameter P11. The factory setting is 38°C. If the room temperature is measured with an internal NTC sensor, the limit can be chosen between 10°C and 40°C. If the room temperature is measured with an external Ni1000 sensor, the limit can be chosen between 10°C and 70°C.

P12 Measurement of room and return temperatures
If the room temperature is to be measured with an internal NTC sensor, SERVice parameter P12 must be assigned a value of 0. This is the factory setting. If the room temperature is measured with a Ni1000 sensor, a value of 1 has to be set. If the parameter has a value of 2, the measured values of the internal NTC sensor and the external Ni1000 sensor are averaged out.

If the return temperature is measured with an external Ni1000 sensor that is used for maximum limitation of the return temperature in district-heating systems, the value is for parameter 3. In this case, a binary signal for minimum flow limitation can be connected in parallel to the input. In this case, the room temperature is measured with an internal NTC sensor.

For measurement of the return temperature using an external Ni1000 sensor for minimum limitation of the return temperature to protect a boiler, a value of 4 must be assigned to the parameter.

For measurement of the return temperature using an external Ni1000 sensor for minimum limitation of the return temperature to protect a heating surface, a value of 5 must be assigned to the parameter

Instead of a room- or return-temperature sensor, it is also possible to connect the room operating units EGS 52/15 or EGT 333 with or without integrated temperature sensor. In this case, a value of 64 should be assigned to the SERVice parameter.

P13, P14 Influence of wall when measuring room temperature
When the temperature is measured on a wall that is also the exterior wall of a house, it is often the case that temperature measured there is different to the temperature in the middle of the room. This distortion is corrected using SERVice parameter P13 or P14. The value of SERVice parameter P13 or P14 is added to the temperature, thereby forming the new temperature value, which is used for control.

Especially on the exterior wall of the house, a lower temperature is measured than in the room during heating mode. Therefore, the heating controller indicates a lower temperature than that in the room.

The display of the measured room-temperature value and the measured value that is used for the control are corrected by SERvice parameter P13/P14. In so doing, the parameter's set value is added to the measured value.

P15

Measurement of outside temperature

If the NRT 114 is employed as a weather-compensating heating controller (P06 = 1), the outside temperature is usually measured with a Ni1000 sensor. This type of measurement for the outside temperature is parameterised ex works. Alternatively, the corresponding input on the NRT 114 can also be configured for an input signal of 0...10 V, which equates to a temperature range of -50...+50°C. For this, the value of SERvice parameter P15 must be set to 1. In addition, a jumper has to be transposed on the NRT 114 (see also MV505760 or MV505761, which are supplied with every NRT 114). Therefore, if several NRT 114s are employed in a large building, only one outside sensor with an active output signal is needed.

P16

Steps for setting the damping for the outside temperature

When the NRT 114 is employed as a weather-compensating heating controller (P06 = 1), the outside temperature is measured. The setpoint for the supply temperature results (in accordance with the heating characteristic) from the measured value for the outside temperature. To take into account the lack of responsiveness of the building's outer walls when calculating the supply temperature as a function of the outside temperature, the outside temperature can also be measured damped (with SERvice parameter P16). The damping can be set in steps which correspond to the values of the SERvice parameter. The range of damping covers reaches from level 0 (undamped) to level 10 (damping with a time constant of 24 hours). The damping is approximately linearly enlarged with each level.

P17

PROG input function

The binary input PROG can be programmed for various different input signals. If the potential between the input and GND is less than 0.4 V, the contacts are interpreted as being closed. If >0.6 V, the contacts are interpreted as being open. The contact current is approx. 1 mA. The value of SERvice parameter P18 determines whether the function is active when the contacts are closed or when they are open. The table below shows the possible temperature steps and the possibilities of influencing the temperature control when the function is active. If the function is not active, the controller works as per the switching programme. The table also shows the value for the SERvice parameter as a function of the input signal, which should be programmed.

PROG input function	Value of SERV parameter	Changes in the temperature steps in automatic mode ¹	Possible influence	Symbol
Absence, external clock	0	T2 → T1, T3 → T1	+ or ² ;  ³	
Presence	1	T0 → T2, T1 → T2	+ or -; 	
Window contacts	2	T2 → T1, T3 → T1	+ or -; 	
Remote switching	3	T1 → T0, T2 → T0, T3 → T0	+ or -; 	
Fault indication	4	-	+ or -; 	
Keypad disabled	5	-	+ or -; 	
Fixed-value control	6	T0 → T4, T1 → T4, T2 → T4, T3 → T4	 (only OFF)	

Tab. 2: Parameter for possible temperature steps and the possibilities of influencing the temperature control

P18

Direction of operation of the PROG input

The direction of operation of the PROG input can be set to either actively closed or actively open. The former means that the function is active when the contacts are closed; the latter means that the function is active when the contacts are open.

P19

Proportional band P controller

SERvice parameter 19 sets the proportional band (XP) of the P controller for MOD3 in K.

P20

Proportional band PI controller

SERvice parameter 20 sets the proportional band (XP) of the PI controller. The unit is K.

P21

Integral action time

SERvice parameter 21 sets the integral action time (TN) for PI control for the flow temperature in seconds.

P22

Valve running time

Valves with motorised actuator require a certain time (called the valve running time) in order to open or close completely. With this SERvice parameter, the heating controller must be set to the running time of the actuator that is used. Only if the valve running time is properly set will the control quality be ideal and will various protective functions be guaranteed.

¹ When the contacts are not active, all temperature steps are controlled as per the switching programme.

² + or – effects a temporary temperature change until the next switching point.

³  Effects an (un)limited temperature change

P23, P24 Minimum and maximum limitation for the supply temperature
If the NRT 114 is used as a supply-temperature controller ($P06 = 1, 3$), it is possible to ensure that the supply temperature neither exceeds nor undercuts certain (settable) values. The value of SERVice parameter P23 sets the lower limit, while the value of SERVICE parameter P24 sets the upper limit. In underfloor heating systems, a safety thermostat must also be used.

P25 Limitation of return temperature
If the NRT 114 controls as per control model 1 or control model 3, the return temperature can also be measured. If the return temperature is, indeed, detected ($P12 = 3$), a fixed limit is set by the value of SERVice parameter P25, and when this is exceeded, the supply temperature's setpoint changes. The size of the change is determined by the level of intervention. The level of intervention is set with SERVice parameter P26. In summer mode, if the heating is run on stand-by (equates to temperature level T_0) or is switched off, the limitation for the return temperature is not active.

P26 Level of intervention on reaching the return temperature's limit
This SERVice parameter states how much the setpoint for the flow temperature is altered on exceeding or undercutting the limit for the return temperature. The size of the change is set by the amount of the value of SERVice parameter P26. Depending on the application, the setpoint for the flow temperature is raised or reduced. If SERVice parameter P12 has a value of 3, this denotes, therefore, a maximum limitation of the return temperature, and the setpoint for the flow temperature is reduced if the return temperature is exceeded. If the return temperature is maintained, i.e. SERVice parameter P12 has the value 4, if the limit value for the return temperature is undercut, the setpoint for the flow temperature is reduced. To protect a heating surface, a value of 5 should be assigned to SERVice parameter P12. In this case, a minimum limitation of the return temperature is carried out, and if the return temperature is undercut, the setpoint for the flow temperature is raised. The limit for the return temperature, at which an intervention occurs, is always set with SERVice parameter P25. See also the example in Section 9.2.

P27 Supply setpoint for T4
When the NRT 114 works in accordance with control model 1 or control model 3, a fixed-value control can be realised with the aid of the PROG input function (see SERVice parameter P17). If, in so doing, the input is active, the supply temperature is controlled to a fixed value. This value is set by SERVice parameter P27. If the input is not active, the supply temperature is controlled as per the switching programme. The fixed-value control has, therefore, priority.

P28

Room-temperature connection

If the NRT 114 is employed as a weather-compensating supply-temperature controller (P06 = 1), control can be optimised by including the room temperature. This helps to keep the room temperature accurate even in extreme conditions. This feature is useful when strong insolation or heat sources (such as a personal computer) can be expected in the room. For this, the internal NTC sensor or an external Ni1000 sensor (option) can be used. The choice of internal or external sensor can be made using SERVice parameter P12. The influence of the room-temperature connection on the supply temperature can be set with SERV parameter P28. Depending on the value of SERVice parameter P28, the following applies:-

- 0 No influence of the room temperature on the supply temperature
- 1 Room temperature has an influence on the supply temperature when the room temperature's setpoint is exceeded.
- 2 Room temperature has an influence on the supply temperature when the room temperature's setpoint is undercut.
- 3 Room temperature always has an influence on the supply temperature

The correction of the supply temperature depends on the slope of the heating characteristic and the deviation of the room temperature. The influence of the room-temperature connection is $\Delta T_F = 3 \cdot (S+1) \cdot (TR_s - TR_i)$, whereby $(TR_s - TR_i)$ is taken into account only to ± 3 K.

P29

Slope for heating characteristic

In the case of weather-compensating supply-temperature control, the heating characteristic (see figure on right) determines the setpoint for the supply temperature as a function of the outside temperature. The heating characteristic is set largely by the base point (the initial point or room temperature-setpoint as well). The slope of the heating characteristic must be set (when the installation is put into service) in accordance with the size of both the heating system and the building.

Recommended values for the slope of the heating characteristic:-

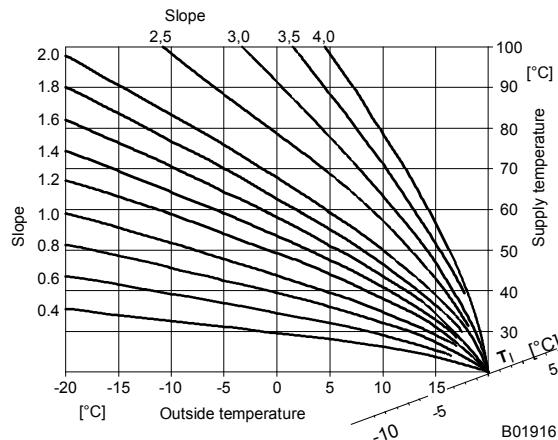


Fig. 3: Guideline for slope of heating characteristic:

- 1,4 for hot-water radiator heating (- 1,0 for low-temperature heating
- 0,6 for underfloor heating

P30

Frost protection

This function enables the installation to be protected against frost by switching on the heating. The frost-protection function cuts in – provided it has been activated with SERVice parameter P30 – when the controller is in automatic mode and the heating is in stand-by mode (equates to temperature level T_0) or when the heating is switched off. Furthermore, the frost-protection limit has to have been undercut. The frost-protection limit is 3°C for the (damped) outside temperature in control model 1 and 8°C for the room temperature in control models 2 and 3. The frost-protection function cuts out again when the (damped) outside temperature rises above 4°C or the room temperature above 9°C. When the frost-protection function cuts in, the valve opens 30% (in MOD2) and the heating pump switches on. In MOD1 and MOD3, T_F is checked. If $T_F < 5^\circ\text{C}$, the valve is opened 30% and the heating pump is switched on. If $T_F > 20^\circ\text{C}$, the valve is closed and the heating pump is switched off.

P31

Relay output function

The relay in the NRT 114 can be used for various different functions. The function is chosen by selecting a value for SERVice parameter P31. There are the following possibilities:-

- 0 Relay is open
- 1 Relay is used to activate the heating pump
- 2 Relay is used to activate a pump for fixed-value control (T_4)
- 3 Relay works as a pilot-timer output that is controlled by the switching programme. This enables the NRT 114 to control further room-temperature controllers without time switching programme synchronously between day temperature (T_3, T_2) and night set-back (T_1, T_0). The temperature steps T_2 (normal temperature) and T_3 (comfort temperature) have the effect that the relay contacts are open.

The temperature steps T_0 (heating stand-by) and T_1 (reduced temperature) have the effect that the contacts are closed.

- 4 Relay has the same function as with a value of 3 for SERVice parameter P31. In addition, the influence of the PROG input function (see SERVice parameter P17) on the temperature steps is taken into account. If fixed-value control is active (temperature level T_4) it has the effect that the relay contacts are open.
- 5 Relay has the same function as with a value of 4 for SERVice parameter P31. In addition, the influence of an (un)limited temperature change on the temperature steps is taken into account.

P32

Anti-jamming function for valves and pumps

To prevent any damage to the heating pump and the valve while they are at a standstill during the summer months, it is possible to have the pump and the valve activated for a brief period at regular intervals. The protection for the heating pump and/or the valve is activated by the value of SERVice parameter P32. If the function is active, the outputs are activated sequentially on the following Sunday at 00:00 hrs if the heating pump or the valve are at standstill for more than 168 hours.

P33

Pump's 'off'-time' at the beginning of a temperature reduction

This function enables heating costs to be saved. If the NRT 114 is employed as a weather-compensating supply-temperature controller ($P06 = 1$) without room-temperature connection ($P28 = 0$), the time in minutes that the heating pump remains switched off at the beginning of a reduction in room temperature is set via the value of SERVice parameter P32. The valve is also closed during this time. A reduction in room temperature means that the temperature level is reduced.

P34

Display of total duration of closed relay contacts

SERVice parameter 34 lets the user know how long the relay contacts (output at terminal 5) were closed in total. The value shown should be multiplied by 10, which equates to the duration in hours.

P35

Calendar switching programme

This SERVice parameter enables or disables the calendar switching programme. Not until the calendar switching programme has been enabled can any calendar switching commands be carried out. If the parameter has a value $\neq <> 0$, the calendar switching programme is enabled. It is possible that the NRT 114 carries out the commands of the calendar switching programme once and then keeps them in the memory ($SP35 = 1$), carries them out once and then deletes them from the memory ($SP35 = 2$) or retains them in the memory and carries them out every year ($SP35 = 3$). The factory setting for this parameter is 1.

P36, P37 Summer/winter or winter/summer time-change
The winter/summer time-change and the summer/winter time-change are carried out automatically using the 12-month clock integrated in the NRT 114. The date for the time-change can be set with the value of SERvice parameters P36 and P37. A value of e.g. 2.16 denotes the 16th February. Provided it is a Sunday, the time-change would take place on the day that equates with the value of the SERvice parameter, otherwise on the following Sunday. The summer/winter time-change is effected at 03:00 hrs (to 02:00 hrs) and the winter/summer time-change takes place at 02:00 hrs (to 3:00 hrs). If SERvice parameters P37 and P38 have the same value, no summer/winter time-change will be carried out.

P38 Display of flow temperature: actual value
SERvice parameter 38 shows the currently measured value for the flow temperature. The flow temperature is measured only if either MOD1 or MOD3 has been selected (see P06).

P39 Display of flow temperature: setpoint
SERvice parameter 39 shows the current setpoint for the flow temperature. The setpoint for the flow temperature is calculated only if either MOD1 or MOD3 has been selected (see P06).

P40 Display of attenuated outside temperature
If weather-compensating flow-temperature control is in force (MOD1), then the outside temperature needs to be measured. The attenuated outside temperature serves as the input variable for the control loop. The attenuation of the outside temperature can be set (see P16). The value of the attenuated outside temperature is stored in P40.

P41 Display of actual value of return temperature
If the measuring of the return temperature has been parameterised (see P06 and P12), the currently measured value for the return temperature can be read via P41.

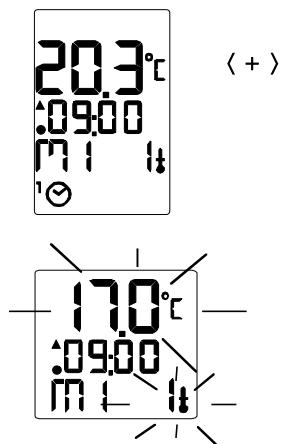
P60 Floor-drying function
The floor-drying function or the operational heating is activated by setting the value for SERvice parameter 60 to 1. Once the floor-drying function is complete, the value for the SERvice parameter should be set to 9. When the floor-drying function has ended, control is effected in accordance with temperature level T_1 . The floor-drying function is described in greater detail in Section 6.

4 Automatic mode

In automatic mode, the NRT 114 controls in accordance with the setpoints of the temperature that were set in the weekly or the 12-month switching programme. In the weekly switching programme, the temperature steps (setpoints for the temperature) are assigned to the day times of a week. A 12-month switching programme can be enabled via the SERVICE mode and then programmed. The temperature steps and the commands of the switching programme can be changed to suit individual requirements.

4.1 Basic functions

Viewing the setpoint for the room temperature

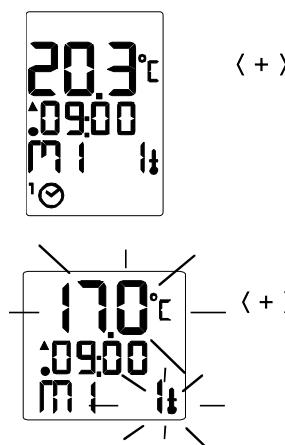


- ▶ Setpoint is shown when either of the two buttons is pressed **once**.

- ▶ View the setpoint
After 2 minutes, the display automatically returns to its original state.
Press <ESC> to return prematurely to the original display.

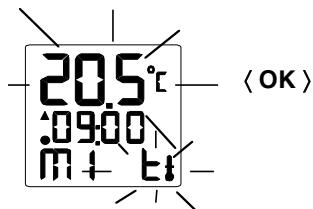
4.1.1 Temporary temperature change

If the room temperature is considered to be too warm or too cold, this function corrects the setpoint for the room temperature in steps of 0.5 degrees up to the next switching command (which is not scheduled to occur for another 2 hours). Switching commands within the next 2 hours will not be executed. This, therefore, provides a so-called party function.



- ▶ This function can be called up by pressing either of the two buttons **once**.
 - The current setpoint for the room temperature is displayed.

- ▶ Change the setpoint



► Confirm changed value



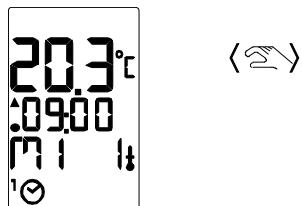
► Confirm changed value



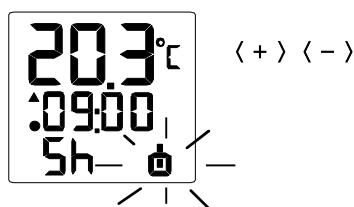
Press <ESC> to abort the function and return to automatic mode.

4.1.2 (Un)limited temperature change

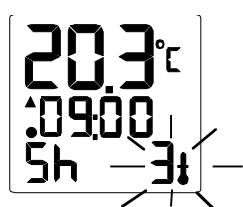
This function can be used to alter the temperature, either limited or unlimited with regard to time, in accordance with the temperature steps. In addition, the heating or the whole installation can be switched off.



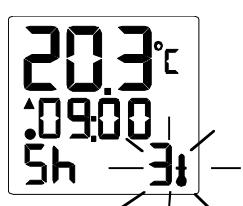
► Call up function



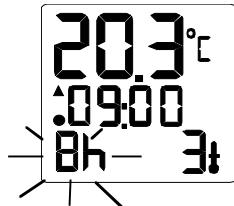
► Choose temperature level



► Confirm temperature level.



► Choose duration. The duration can be in steps of 19d 19 days to 3h 3 hours. You can set either a **t** temporary or an **u** unlimited temperature change.



► Confirm duration.



► Display when function is active.



Press <ESC> to abort the function and return to automatic mode.

4.2 Menu functions

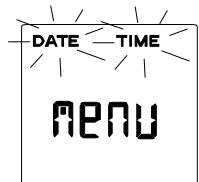
4.2.1 Time and date

This function is used to change the set time and date. To view the set time and date, call up the same function. The same steps are carried out, but, using the + or – buttons, no changes are performed.



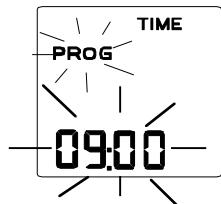
< MENU >

► Call up the menu.



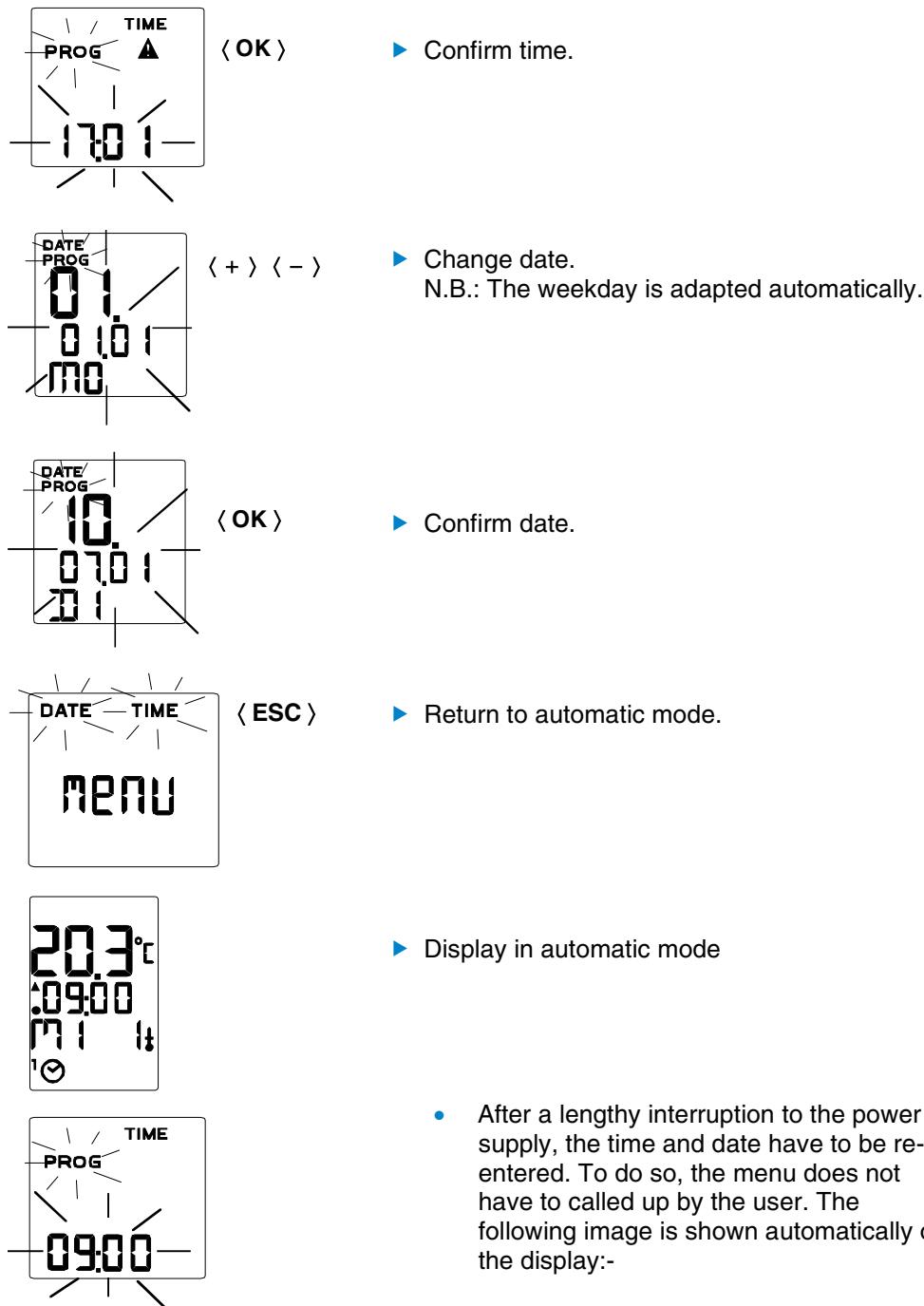
< OK >

► Choose the time/date menu item.



< + > < - >

► Change time.



Thereafter, continue as described in the steps above. If the time and date are not confirmed, and you return straight to automatic mode by pressing <ESC>, a warning appears in the display.

- After a lengthy interruption to the power supply, the time and date have to be re-entered. To do so, the menu does not have to be called up by the user. The following image is shown automatically on the display:-

4.2.2 Temperature steps

The symbols (shown in the display) for the temperature steps have the following meaning:-

	T ₀	Installation off; frost-protection active, unless it was de-activated in SERVice mode
	T ₀	Heating off; function PROG input is enabled; frost-protection active, unless it was de-activated in SERVice mode
	T ₁	Reduced temperature
	T ₂	Normal temperature
	T ₃	Comfort temperature

The three temperature steps (T₁, T₂, T₃) can be changed individually.

Temperature steps 1 to 3 should be set as follows: Level 1 must have a lower temperature than Level 2. The temperature for Level 2 must, in turn, be less than that for Level 3:-

$$T_1 \leq T_2 \leq T_3$$

The temperature steps can be change within a range that was laid down in SERVice mode (SERVice parameter P10 and P11).

When programming the weekly switching programme, you can choose between the three temperature steps (T₁, T₂, T₃). When you program the 12-month switching programme, you can choose between all temperature steps (Installation off, T₀, T₁, T₂, T₃). The lower temperature level from the weekly and 12-month switching programmes has priority.

Factory setting for the temperature steps

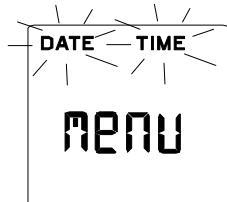
	17°C
	20°C
	21°C

If the factory setting for the temperature level is changed, we recommend that you enter the changed values in the relevant table in Section 16.

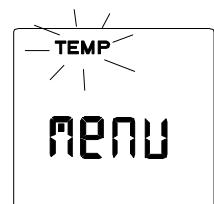
4.2.2.1 View temperature steps



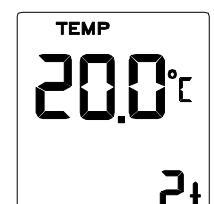
◀ Call up the menu.



◀ Scroll through the menu until you see the following screen.

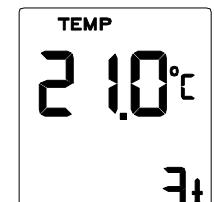


◀ Select the 'Temperature steps' menu item.



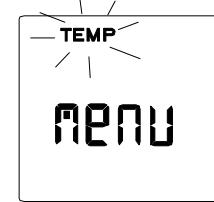
◀ Scroll through the temperature steps and view.
20.0°C is the temperature value
2 is temperature level 2

▶ Return to automatic mode.



◀ ESC ▶

▶ Return to menu.



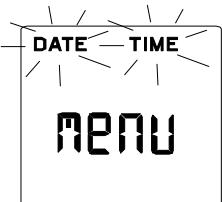
▶ Display in automatic mode.



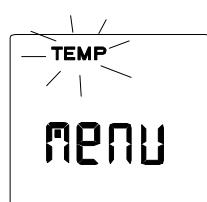
4.2.2.2 Change temperature steps



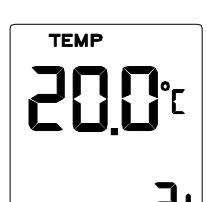
▶ Call up the menu



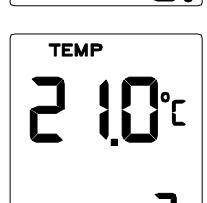
▶ Scroll through the menu until you see the following screen.



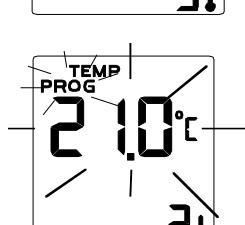
▶ Select the 'Temperature steps' menu item.



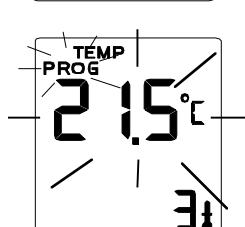
▶ Scroll through the temperature steps
20.0°C is the temperature value
2 is temperature level 2



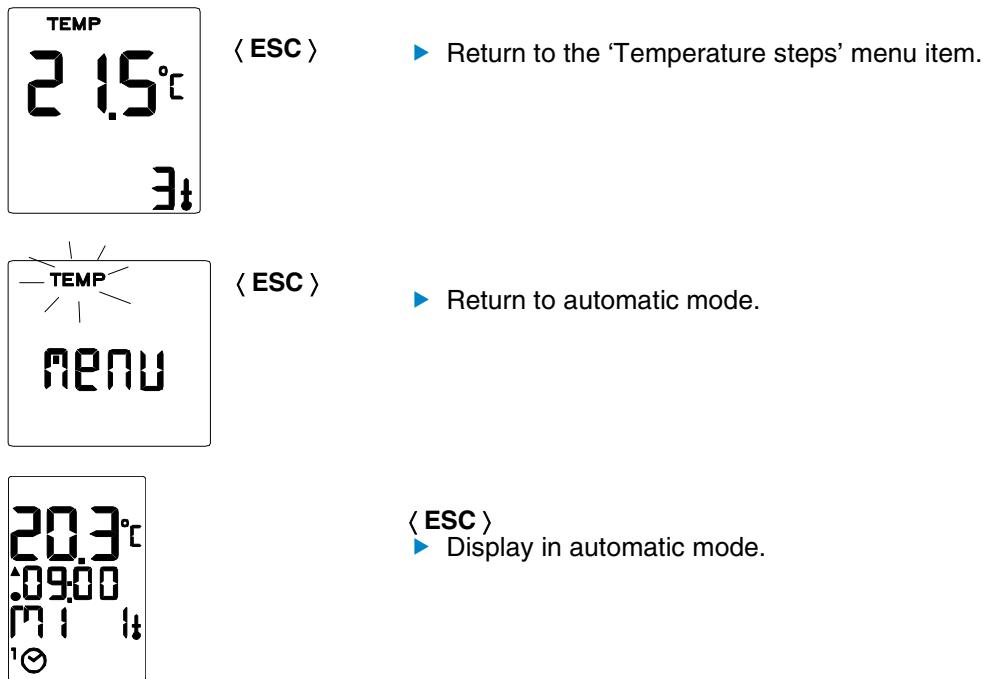
▶ Call up the temperature level that you want to change.



▶ Change the value of the temperature.



▶ Confirm value.



4.2.3 Weekly switching programme

The weekly switching programme repeats itself every week. It comprises up to 42 switching commands with the associated temperature steps, which can be entered in a 10-minute grid. The switching commands can be changed individually and are captive. A switching command can be valid daily (1-7) or on a certain day (Mon, Tue etc.). If there is a switching command on a certain weekday (Mon, Tue etc.), the daily switching command (1-7) does not apply on this day. When the memory for the weekly switching programme is full, the word 'End' appears in the display. An 'empty' switching programme is interpreted as a switching programme with temperature level T₃. In automatic mode, the clock symbol (without an index of 1) is shown on the LCD when the weekly switching programme is 'empty'.

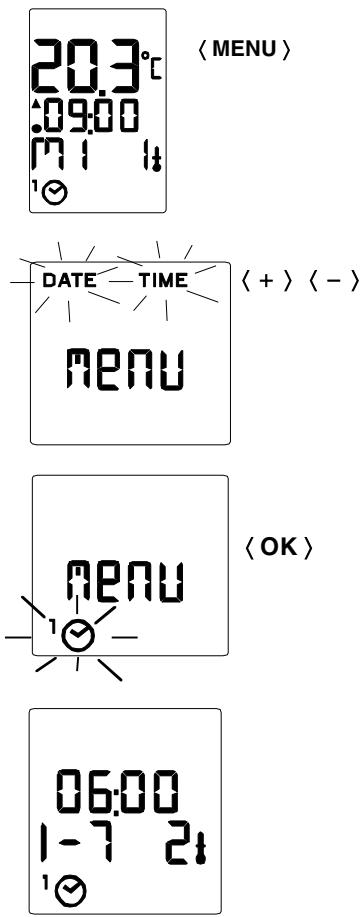
Factory setting for weekly switching programme:-

Mon...Tue	from 06:00h: 21	from 15:00h: 31	from 22:00h: 11
Fri	from 06:00h: 21	from 15:00h: 31	from 22:30h: 11
Sat	from 07:00h: 21	from 15:00h: 31	from 23:00h: 11
Sun	from 07:00h: 21	from 15:00h: 31	from 22:00h: 11

Tab. 3: Factory settings for weekly switching programme

If the factory setting for the weekly switching programme is changed, we recommend you to enter the changed values in the relevant table in Section 16.

4.2.4 Call up the weekly switching programme



► Call up the menu.

► Scroll through the menu until you see the following screen.

► Choose the 'Weekly switching programme' menu item.

► Display for a switching command in the weekly switching programme.

06:00 denotes the time at which the temperature level is switched

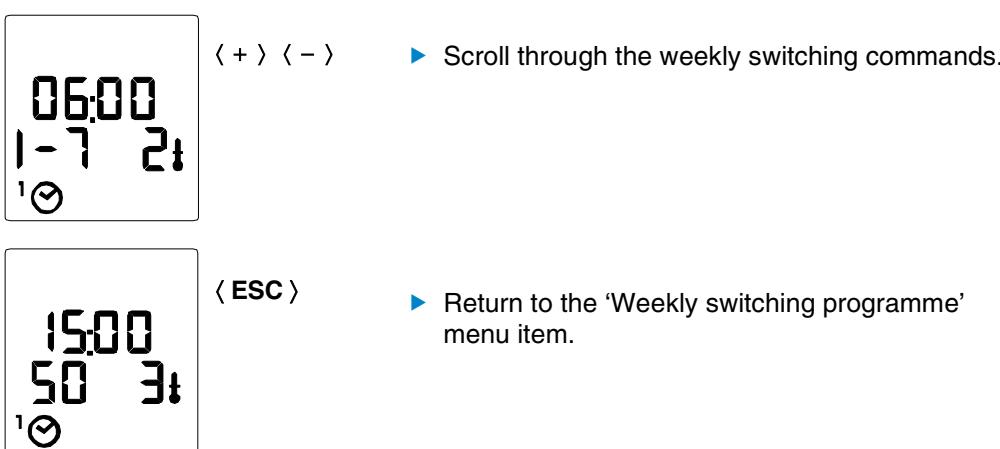
1-7 the switching command applies on a daily basis

2t control is effected as per T₂

4.2.4.1 View switching commands

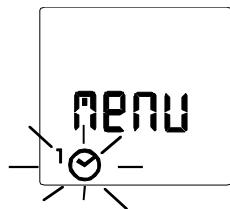
When the weekly switching programme has been called up, the first switching command is shown.

The display then looks, for instance, as follows:-



► Scroll through the weekly switching commands.

► Return to the 'Weekly switching programme' menu item.



⟨ ESC ⟩ ► Return to automatic mode.



► Display in automatic mode

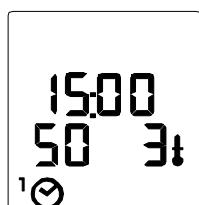
4.2.4.2 Change switching commands

When the weekly switching programme has been called up, the first switching command is shown.

The display then looks, for instance, as follows:-



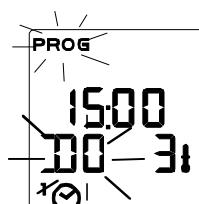
⟨ + ⟩ ⟨ - ⟩ ► Scroll through the weekly switching commands.



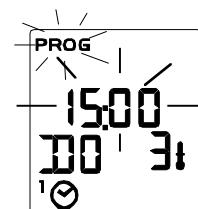
⟨ OK ⟩ ► Choose a weekly switching command



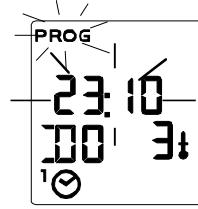
⟨ + ⟩ ⟨ - ⟩ ► Change weekday



⟨ OK ⟩ ► Confirm weekday



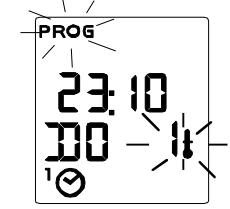
◀ + ▶ - ▶ Change time



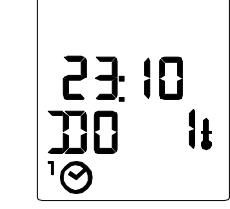
◀ OK ▶ Confirm time



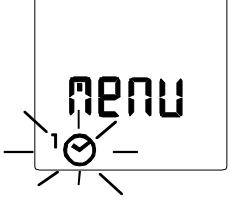
◀ + ▶ - ▶ Change temperature level



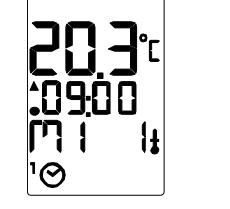
◀ OK ▶ Confirm temperature level



◀ ESC ▶ Return to the 'Weekly switching programme' menu item



◀ ESC ▶ Return to automatic mode

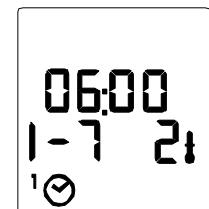


◀ ▶ Display in automatic mode

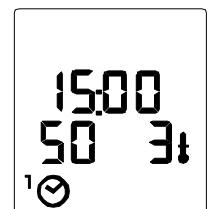
4.2.4.3 Delete switching command

When the weekly switching programme has been called up, the first switching command is shown.

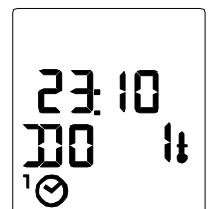
The display then looks, for instance, as follows:-



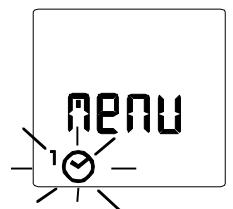
⟨ + ⟩ ⟨ - ⟩ ► Scroll through the weekly switching commands.



⟨ CLR ⟩ ► Delete weekly switching command⁴



⟨ ESC ⟩ ► Return to the 'Weekly switching programme' menu item



⟨ ESC ⟩ ► Return to automatic mode



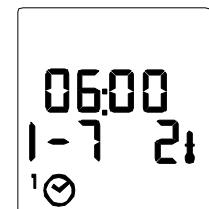
► Display in automatic mode

⁴ If the <CLR> button is pressed for longer than 10 seconds, all the commands in the weekly switching programme will be deleted.

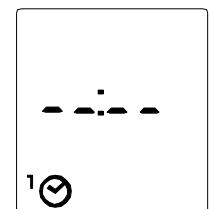
4.2.4.4 Enter new switching command

When the weekly switching programme has been called up, the first switching command is shown.

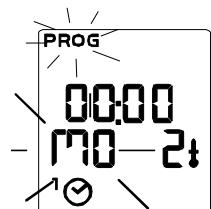
The display then looks, for instance, as follows:-



< + > < - > ▶ Scroll through the weekly commands until you see the following screen



< OK > ▶ Choose a spare weekly switching command



< + > < - > ▶ Change the weekday



...for further procedure, see the corresponding position in the 'Change switching command' section.

4.2.5 12-month switching programme

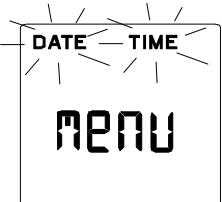
Before you can work with the calendar programme, it has to be activated in SERViCe mode (see Section 3.2). The calendar programme can influence the automatic mode over longer periods in addition to the weekly programme. Date periods (e.g. for holidays) are set in the 12-month switching programme; in these periods, the weekly switching programme is enabled only up to a certain temperature level. For this, there are up to 6 switching commands (3 periods) available, comprising date and temperature level; these can be entered in the daily grid. When the memory for the 12-month switching programme is full, the word 'End' appears in the display. An 'empty' switching programme is interpreted as a switching programme with temperature level T3.

If the 12-month switching programme is changed, we recommend you to enter the changed values in the relevant table in Section 16.

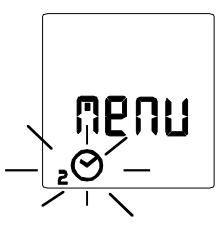
4.2.5.1 Call up the 12-month switching programme



◀ MENU ▶ Call up the menu



◀ + ▶ - ▶ Scroll through the menu until you see the following screen



◀ OK ▶ Choose the '12-month switching programme' menu item



▶ Display for a switching command in the 12-month switching programme.
15 = day
03 = month
01 = year from which the switching command applies
TH = weekday for the entered switching date
0t = temperature level that applies as per 12-month programme

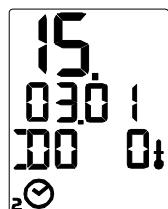


▶ Display for a spare switching command in the 12-month switching programme

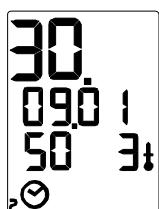
4.2.5.2 View switching commands

When the 12-month switching programme has been called up, the first switching command is shown.

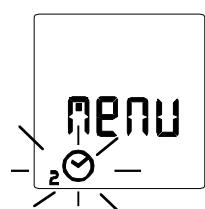
The display then looks, for instance, as follows:-



⟨ + ⟩ ⟨ - ⟩ ► Scroll through the 12-month switching commands



⟨ ESC ⟩ ► Return to the '12-month switching programme' menu item



⟨ ESC ⟩ ► Return to automatic mode

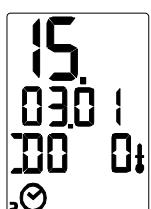


► Display in automatic mode

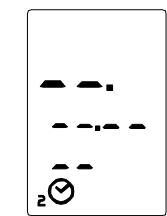
4.2.5.3 Enter new switching command

When the 12-month switching programme has been called up, the first switching command is shown.

The display then looks, for instance, as follows:-

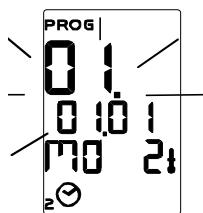


⟨ + ⟩ ⟨ - ⟩ ► Scroll through the annual commands until you see the following screen



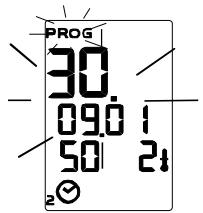
⟨ OK ⟩

- ▶ Choose a spare annual command



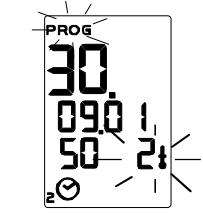
⟨ + ⟩ ⟨ - ⟩

- ▶ Change the date for the switching command



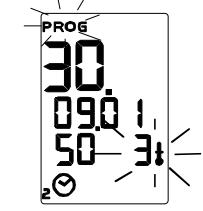
⟨ OK ⟩

- ▶ Confirm date



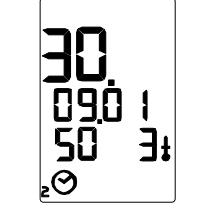
⟨ + ⟩ ⟨ - ⟩

- ▶ Change the temperature level



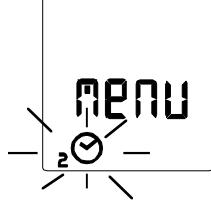
⟨ OK ⟩

- ▶ Confirm temperature level



⟨ ESC ⟩

- ▶ Return to the '12-month switching programme' menu item



⟨ ESC ⟩

- ▶ Return to automatic mode

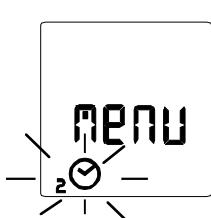


- ▶ Display in automatic mode

4.2.5.4 Delete switching command

When the 12-month switching programme has been called up, the first switching command is shown.

The display then looks, for instance, as follows:-

-  (+) (-) ▶ Scroll through the 12-month switching programme
-  (CLR) ▶ Delete the annual switching command⁵
-  (ESC) ▶ Return to the '12-month switching programme' menu item
-  (ESC) ▶ Return to automatic mode
-  ▶ Display in automatic mode

⁵ If the <CLR> button is pressed for longer than 10 seconds, all the commands in the 12-month switching programme will be deleted.

5 Manual mode

In manual mode, the heating system can be controlled by hand during installation or in the event of a fault. In manual mode, there is no automatic control. The pump is switched on or off. The valve opening is set. Before you can work in manual mode, it has to be enabled in SERVICE mode (see Section 3.2).

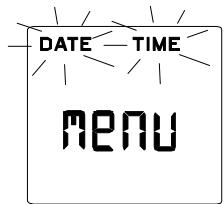
So that the NRT 114 can work in accordance with the settings in manual mode, it must be activated. If manual mode is active, the following display is shown on returning from the menu level.



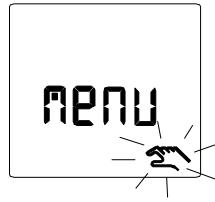
5.1 Access to manual mode



◀ Call up the menu.



◀ + - ▶ Scroll through the menu until you see the following screen.



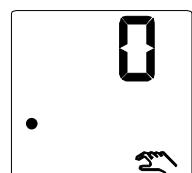
◀ OK ▶ Choose the 'Manual mode' menu item.



▶ Display, after the 'Manual mode' menu item has been called up.

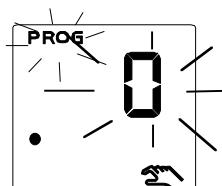
5.2 Set status of pump (on/off) for manual mode

After the 'Manual mode' menu item has been chosen, the 'Pump relay' menu item is shown.



⟨ OK ⟩

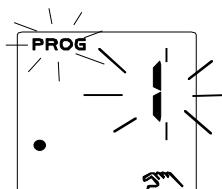
- ▶ Choose the 'Pump relay' menu item.



⟨ + ⟩ ⟨ - ⟩

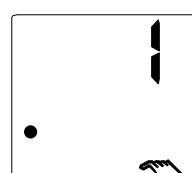
- ▶ Choose the pump status.
Explanations:

- | Relay closed (pump on)
- | Relay open (pump off)



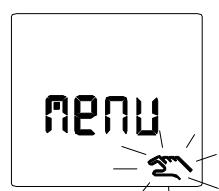
⟨ OK ⟩

- ▶ Confirm pump status.



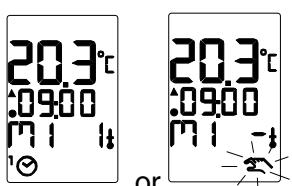
⟨ ESC ⟩

- ▶ Return to the 'Manual mode' menu item.



⟨ ESC ⟩

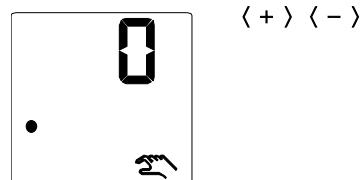
- ▶ Return to automatic mode or manual mode.



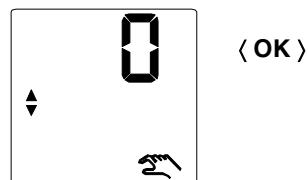
- ▶ Display in automatic mode (if manual mode was not activated) or manual mode.

5.3 Set valve position

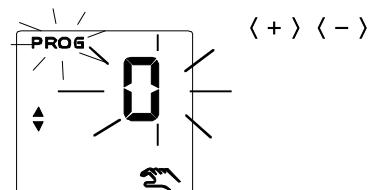
After the ‘Manual mode’ menu item has been chosen, the ‘Pump relay’ menu item is shown.



- ▶ Scroll through the menu until you see the following screen



- ▶ Call up the ‘Valve position’ menu item



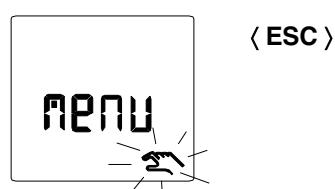
- ▶ Choose the valve opening in%



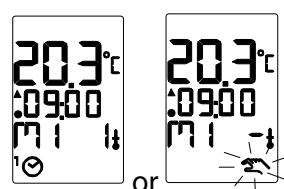
- ▶ Confirm the valve opening in%



- ▶ Return to the ‘Manual mode’ menu item



- ▶ Return to automatic mode or manual mode



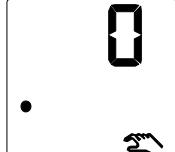
- ▶ Display in automatic mode (if manual mode was not activated) or manual mode



If manual mode is active (see section 5.4), the valve is firstly closed completely after an entry has been made for the value of the valve opening. Subsequently, the valve is opened again in accordance with the value entered.

5.4 Activate and deactivate manual mode

After the ‘Manual mode’ menu item has been chosen, the ‘Pump relay’ menu item is shown.



◀ + ▶ - ◀ OK ▶

▶ Scroll through the menu until you see the following screen.



▶ Call up the ‘(De-)activate manual mode’ menu item.



◀ + ▶ - ◀ OK ▶

▶ Choose status for manual mode.
Explanations:
ON Manual mode activated
OFF Manual mode de-activated



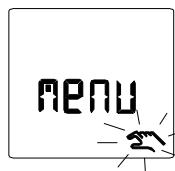
◀ OK ▶

▶ Confirm status for manual mode.



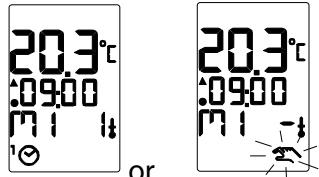
◀ ESC ▶

▶ Return to the ‘Manual mode’ menu item.



◀ ESC ▶

▶ Return to automatic mode or manual mode



or

▶ Display in automatic mode (if manual mode was not activated) or manual mode



When manual mode has been activated, the pump is switched on – in accordance with the setting (see section 5.2) – and the valve is closed completely. Subsequently, the valve is opened again in accordance with the value entered (see section 5.3).

6 Floor drying

Part 4 of EN 1264 describes how anhydrite cement floors have to be treated using the operational heating facility before any floor covering is laid. First of all, a supply temperature of 25°C has to be maintained for 3 days. Then the maximum supply temperature has to be maintained for a further 4 days.

This function has been implemented in the NRT 114. The function is called up with the aid of SERVice parameter P60, and a value of 1 has to be assigned to the SERVice parameter. The manner of accessing the SERVice mode and the method of procedure for changing SERVice parameters are described in section 3.2. To be on the safe side, the NRT 114 should be matched to the plant before the floor-drying function is activated.

If the function has been activated and the controller is no longer in SERVice mode, the following display appears:-

Display when floor-drying function is active.



Explanations:

25.3°C	Actual temperature (see SERVice parameter P09)
13:00	Current time (13:00 hrs)
5d	Remaining time for floor-drying function (5 days)

When the floor-drying function has been successfully concluded, SERVice parameter P60 is given a value of 9, which can be read only. The value can be changed back only to either 0 or 1.

When the floor-drying function has finished, the NRT 114 returns automatically to automatic mode. The supply temperature is controlled in accordance with temperature level T₁ in ‘unlimited temperature change’ mode (see Section 4.1.2).

When the floor-drying function is in operation, the following functions can be called up or changes can be made:-

- All menu functions with the exception of manual mode. The manual mode may be shown in the menu, but it cannot be called up.
- SERVice mode can be called up, and the SERVice parameters can be changed.

The basic functions (see section 4.1) cannot be executed.

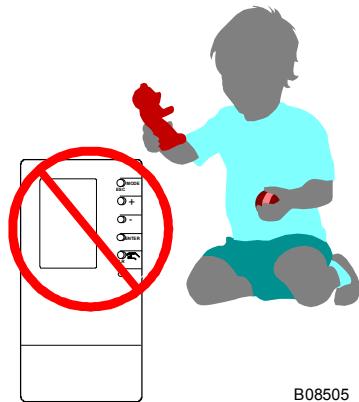
The floor-drying function can be aborted by taking one of the following measures:-

- Set SERVice parameter P60 to 0. The NRT 114 then returns to automatic mode as per the switching programme.
- Change SERVice parameter P06 (control model) to a value of either 0 or 2. If SERVice parameter P04 (software reset) is changed, it causes the SERVice parameters to be reset to the factory setting.

The floor-drying function will be aborted in the event of an interruption to the power supply or to the sensor. Once the fault has been rectified, the floor-drying function automatically starts again with a total duration of 7 days.

The behaviour of the NRT 114 in the event of a fault, e.g. an interruption to the sensor, is described in section 8.3.

7 Keypad lock



The keypad lock prevents the heating controller from being misused, e.g. by children.

The lock is activated by pressing these keys in the following sequence:-

< OK >

< + >

< - >

< ☰ >

The keypad lock can be revoked by using the same sequence.



Display in automatic mode when the keypad lock is activated.

Explanations:-

20.3°C Actual temperature (see SERVice parameter P09)

09:00 Current time

Mi Current weekday (Wednesday)

1 Temperature level 1

☰ Automatic mode as per the weekly switching programme

☒ Keypad lock is active

8 Faults

Before calling the heating technician, check: fuses, main plant switch, burner function, heating pump, valve, fault indicator, time and weekday shown on the NRT 114.

8.1 Reset functions

If a fault is suspected in the heating controller due to extreme network disturbances: press the reset button using a ballpoint pen (see section 2.3). The SERVice parameters and switching programmes are not affected by this, but the time and (perhaps) the date have to be re-entered.

If all SERVice parameters and/or the switching programme have to be reset to the factory setting, it can be carried out by a technician using SERVice parameter P04 (see section 3.2) in SERVice mode.

8.2 Fault indication

If faults occur, they are indicated by the abbreviation 'ERR' in the display. The faults are encoded in the device status. The device status can be retrieved in SERVice mode using SERVice parameter P02 (see section 3.2). Once the fault has been rectified, the device status is reset immediately.

The following fault messages are shown in the display:-

Explanations:-



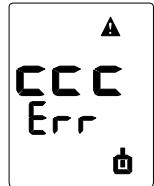
22.4°C Actual temperature (see SERVice parameter P09)

Err Indication that a fault has occurred.



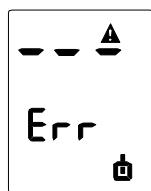
UUU Interruption to the sensor that indicates the actual temperature (see SERVice parameter P09)

Err Indication that a fault has occurred.



CCC circuit in the sensor that indicates the actual temperature (see SERVice parameter P09)

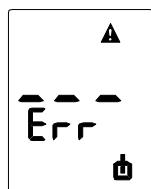
Err Indication that a fault has occurred.



Measured value from the sensor that indicates the actual temp. is too high (see SERVice parameter P09)

Err

Indication that a fault has occurred.



Measured value from the sensor that indicates the actual temp. is too low (see SERVice parameter P09)

Err

Indication that a fault has occurred.

8.3 Measures to be taken in the event of faulty temperature data

Depending on the range in which the temperature measurements lie, measures are taken with respect to the valve and pump control. The ranges are explained below, and the corresponding measures are shown:-

Range 1	Control mode; no additional measures with respect to pump and valve control
Range 2	Control mode based on the last recorded value from Range 1
Range 3	Valve is closed, taking into account 1.7 times the valve running time; pump is switched off after 1.7 times the valve running time has elapsed

The table below lists the ranges for the various types of sensor.

Sensor (Ni1000)	Range 1	Range 2	Range 3
Supply temperature	-1.0°C...+140.5°C	-100.0°C...-1.0°C; +140.5°C...+200.0°C	<-100.0°C, > +200.0°C
Outside temperature	-50.0°C...+50.0°C	-100.0°C...-50.0°C; +50.0°C...+200.0°C	<-50.0°C; > +200.0°C
Room temperature, external	-5.0°C...+140.5°C	-100.0°C...-5.0°C; +140.5°C...+200.0°C	<-100.0°C; > +200.0°C
Room temperature, internal	-5.0°C...+45.0°C	< -5.0°C, > 45.0°C	not defined
Return temperature	-1.0°C...+140.5°C	-100.0°C...-1°C; +140.5°C...+200°C	> +200.0°C; (< -100.0°C Flim)

Tab. 4: Ranges for the various types of sensor

9 Application information

9.1 General information



This application requires an additional safety thermostat.

The slope of the characteristic and the limitation of the supply temperature should certainly be checked before putting the plant into operation.

Depending on the application, the following settings are recommended:-

Radiator heating	Slope of the characteristic	SERVice parameter SP29	Value 1,4 (°C)
	Limitation supply temperature	SERVice parameter SP24	Value 75°C (°C)

Underfloor heating	Slope of the characteristic	SERVice parameter SP29	Value 0,6
	Limitation supply temperature	SERVice parameter SP24	Value 50°C

The recommended values have proved themselves in practice, but are not necessarily the best solution for every plant. No responsibility can be accepted for the values stated.

9.2 Examples of application

9.2.1 Control model 1: Weather-compensating supply-temperature control

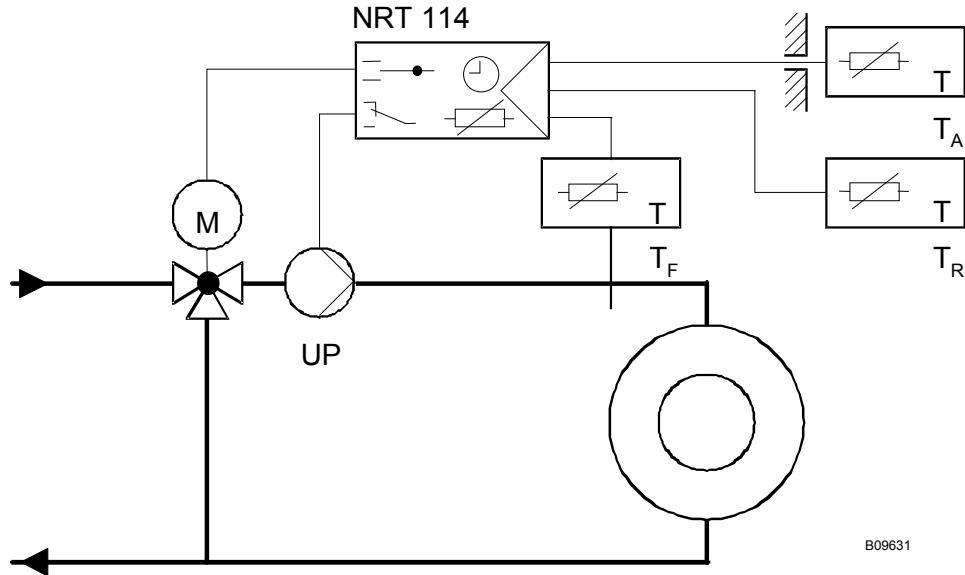


Fig. 4: Control model 1: Weather-compensating supply-temperature control

Other important SERVice parameters (see section 3.2):-

- SERVice parameter P12 (room- and measurement of return temperature):-
 - 0 = Measurement of room temperature using internal NTC sensor
 - 1 = Measurement of room temperature using external Ni1000 sensor
 - 2 = Measurement of room temperature using internal NTC and external Ni1000 with averaging
- SERVice parameter P28 (room-temperature connection):-
 - 0 = not active
 - 1 = active when $T_{Ri} > TR_s$
 - 2 = active when $T_{Ri} < TR_s$
 - 3 = active when $T_{Ri} < > TR_s$

9.2.2 Control model 1: Weather-compensating supply-temperature control with limitation of the primary return temperature (max.)

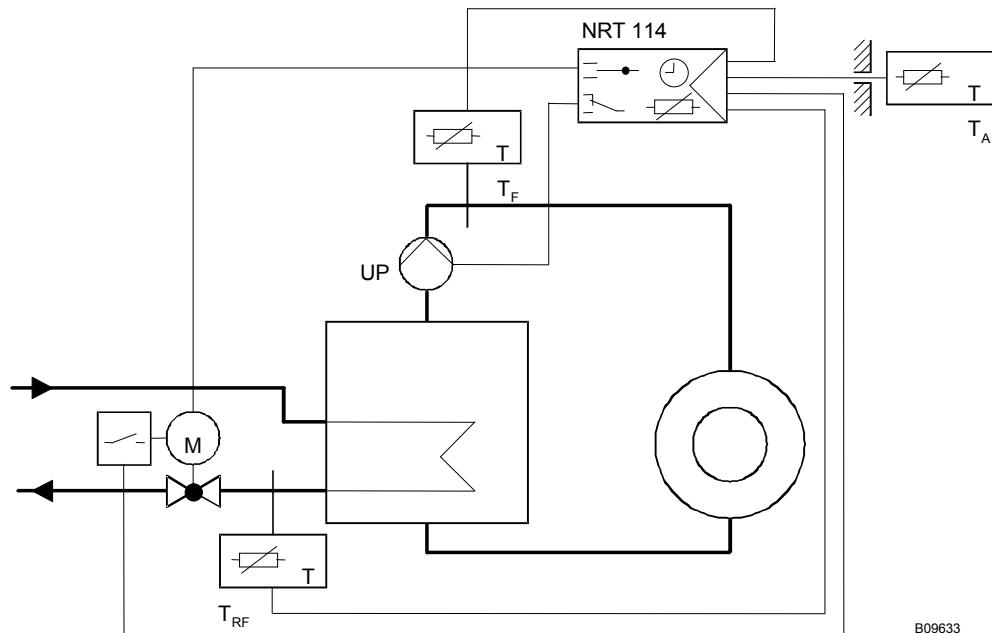


Fig. 5: Control model 1: Weather-compensating supply-temperature control with limitation of the primary return temperature (max.)

Other important SERvice parameters (see Section 3.2):-

- SERvice parameter P12 (measurement of room and return temperatures):-
 - 3 = Measurement of return temperature using external Ni1000 sensor for minimum limitation of return temperature. Optional with binary input F_{Lim} for minimum flow limitation. The room temperature can be measured with an internal sensor, if need be.
- SERvice parameter P25 (limitation of return temperature)
- SERvice parameter P26 (level of intervention on reaching the return temperature's limit)
- SERvice parameter P28 (room-temperature connection):-
 - 0 = Not active
 - 1 = Active when T_{Ri} > T_{Rs}
 - 2 = Active when T_{Ri} < T_{Rs}
 - 3 = Active when T_{Ri} < > T_{Rs}

9.2.3 Control model 1: Weather-compensating supply-temperature control with limitation of return temperature (min.)

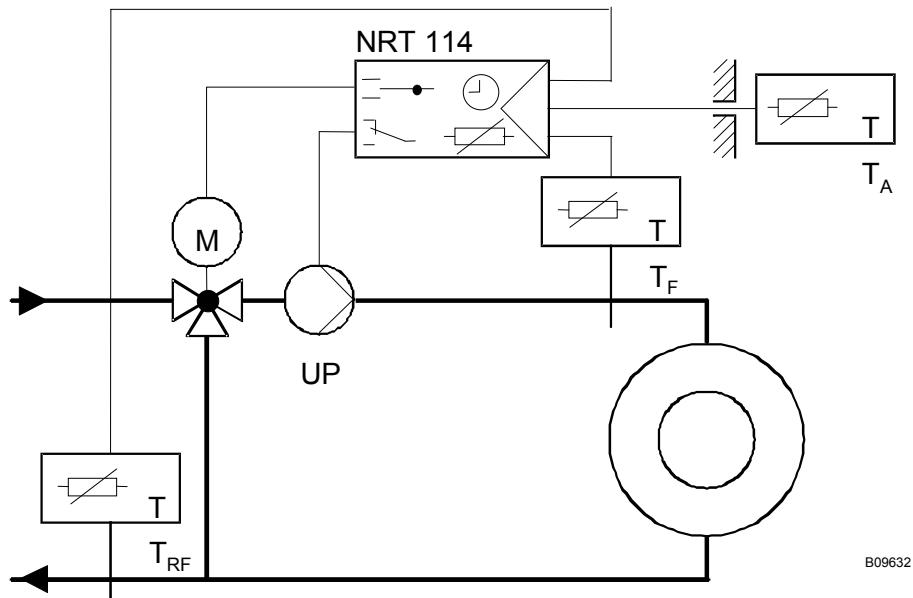


Fig. 6: Control model 1: Weather-compensating supply-temperature control with limitation of return temperature (min.)

Other important SERvice parameters (see Section 3.2):-

- SERvice parameter P12 (measurement of room and return temperatures):-
 - 3 = Measurement of return temperature using external Ni1000 sensor for minimum limitation of return temperature. Optional with binary input FLim for minimum flow limitation. The room temperature can be measured with an internal sensor, if need be.
- SERvice parameter P25 (limitation of return temperature)
- SERvice parameter P26 (level of intervention on reaching the return temperature's limit)
- SERvice parameter P28 (room-temperature connection):-
 - 0 = Not active
 - 1 = Active when $T_{Ri} > TR_s$
 - 2 = Active when $T_{Ri} < TR_s$
 - 3 = Active when $T_{Ri} < > TR_s$

9.2.4 Control model 2: Room-temperature control

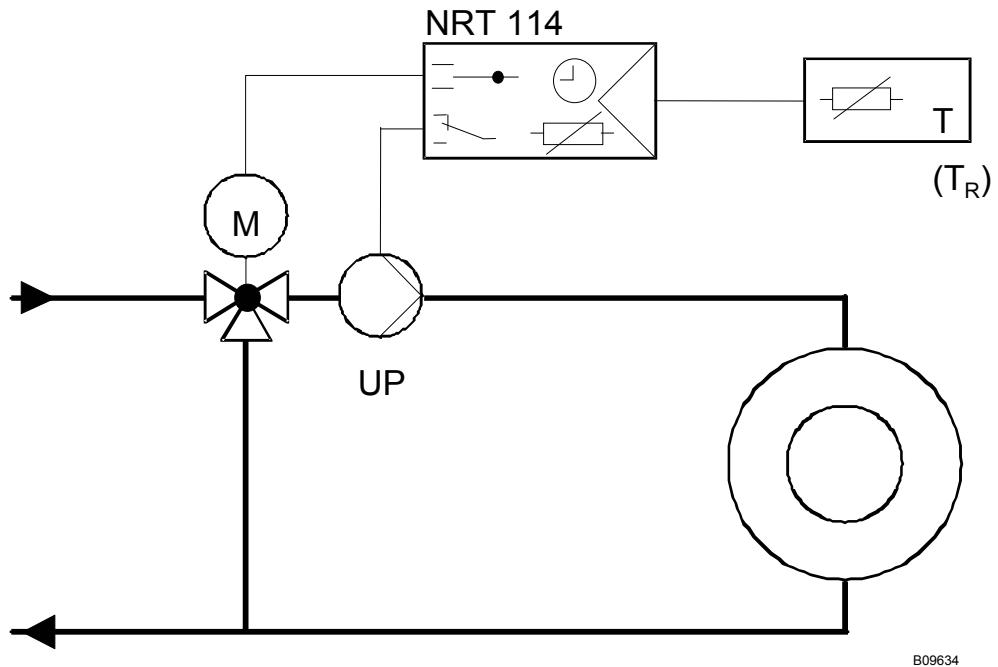


Fig. 7: Control model 2: Room-temperature control

Other important SERVice parameters (see Section 3.2):-

- SERVice parameter P12 (measurement of room and return temperatures):-
 - 0 = Measurement of room temperature using internal NTC sensor
 - 1 = Measurement of room temperature using external Ni1000 sensor
 - 2 = Measurement of room temperature using internal NTC and external Ni1000 with averaging
- SERVice parameter P20 (Proportional band PI control)
 - Recommended value 2 K
- SERVice parameter P21 (integral action time PI control)
 - Recommended value 900 seconds



The recommended values have proved themselves in practice, but are not necessarily the best solution for every plant.

9.2.5 Control model 3: Room-temperature-led supply-temperature control

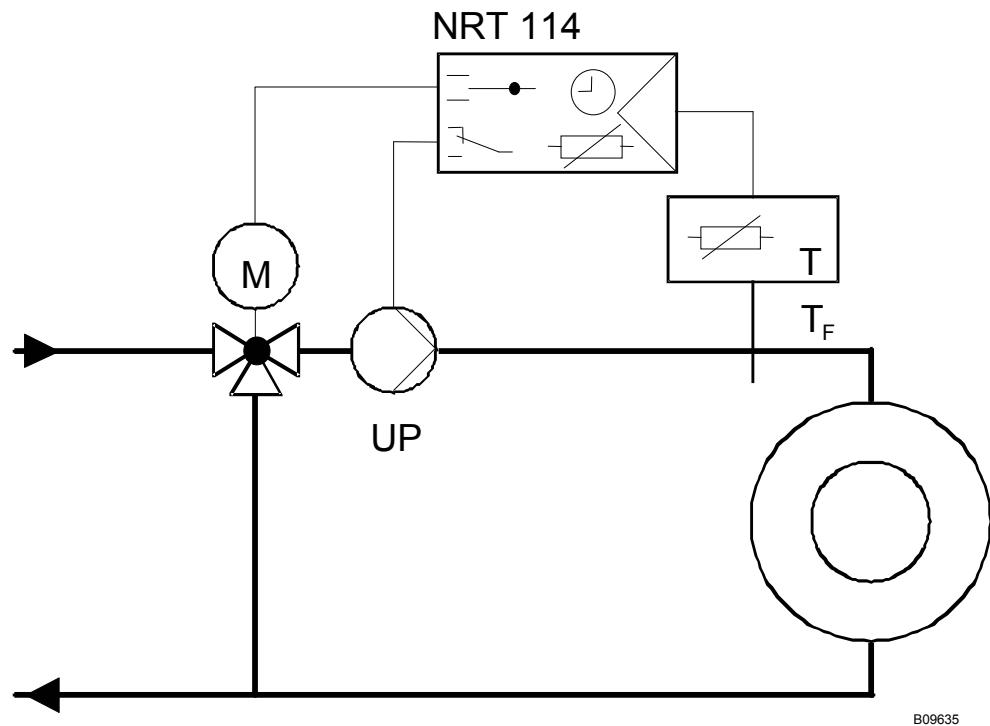


Fig. 8: Control model 3: Room-temperature-led supply-temperature control

Other important SERVice parameters (see Section 3.2):-

- SERVice parameter P12 (measurement of room and return temperatures):-
 - 0 = Measurement of room temperature using internal NTC sensor
 - 1 = Measurement of room temperature using external Ni1000 sensor
 - 2 = Measurement of room temperature using internal NTC and external Ni1000 with averaging

10 Tips on saving

The heating system is by far the biggest consumer of energy in the household. Heating accounts for 78% of the energy required in the home (according to 'Wohnen & Energie Sparen'; BINE Informationsdienst des Fachinformationszentrum Karlsruhe; July 2004), yet big savings are possible here. Most occupants underestimate the savings potential for heating and overestimate it for their other appliances. By improving the insulation, at least half of heating energy could be saved.

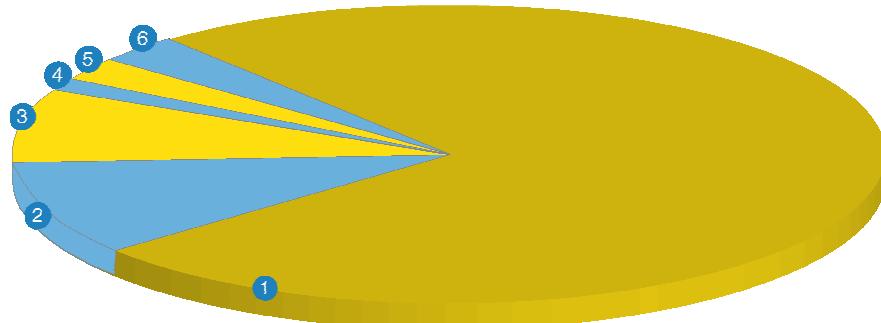


Fig. 9: Share of energy consumers in the household

①	Heating	60%
②	Household goods	17%
③	Hot water	13%
④	Others	2%
⑤	Consumer electronics	4%
⑥	Lighting	4%

Savings are also possible by installing modern heating systems and intelligent control systems. Using the heating controller, a night-time reduction of 3°C saves about 5 to 8% of energy; having a constant temperature of 18°C in the bedrooms and night-time reduction in the living rooms saves about 12 to 15%; having a constant temperature of 16°C in the bedrooms and a set-back by 3°C in the living rooms during periods of non-occupation and at night saves about 25%.

Further tips

If possible, move forward the starting time for reduced operation. Every degree of reduction in the normal temperature provides a saving of about 6% in heating costs. Air the room briefly but thoroughly. At night, close the shutters or window blinds. Keep radiators clear, i.e. do not place any furniture in front of them, or let curtains hang over or in front of them etc.

11 Resistance values for Ni1000 sensor

The temperature sensors used (depending on the application for the NRT 114) must comply with DIN 43760.

The resistance of the nickel measuring resistor changes as a function of temperature. The temperature coefficient is stets positive, i.e. the resistance increases as the temperature rises; see table (DIN 43760). Within the bounds of the stated tolerances, the sensors can be exchanged without calibration.

Temperature [°C]	Resistance values [Ω] Ni1000
90	1549
80	1483
70	1417
60	1353
50	1291
40	1230
30	1171
20	1112
10	1056
0	1000
-10	946
-20	893
-30	842
-40	791

Tab. 5: Resistant values for Ni1000

12 Accessories

Miscellaneous	▪ 303124 000 ▪ 386273 001 ▪ 0313346 001	Recessed junction box Plug-in power unit: input 230V~, output 24V ~ (0.38 A), cable 1.8 m, IP30 Module 0-10 V for Ni1000
Sensors	▪ EGT 301 F101 ▪ EGT 311 F101 ▪ EGT 330 F101 ▪ EGT 333 F101	Outside-temperature sensor Clamp-on temperature sensor Room-temperature sensor Room-temperature sensor with setpoint potentiometer
Valves/drives	▪ AVM 104/114 F... ▪ AVM 124/130 ▪ AXM 117 F201 ▪ VXN... ▪ BXN... ▪ VxL... ▪ BxL... ▪ VUD/E/G (PN6/10/16/25) ▪ BUD/E/G (PN6/10/16/25)	Actuator Actuator Motorised drive for unit valves Through valve Three-way valve Unit through valve Unit three-way valve Through flanged valve Three-way flanged valve

For further components, see Sauter PDS

13 Wiring diagram

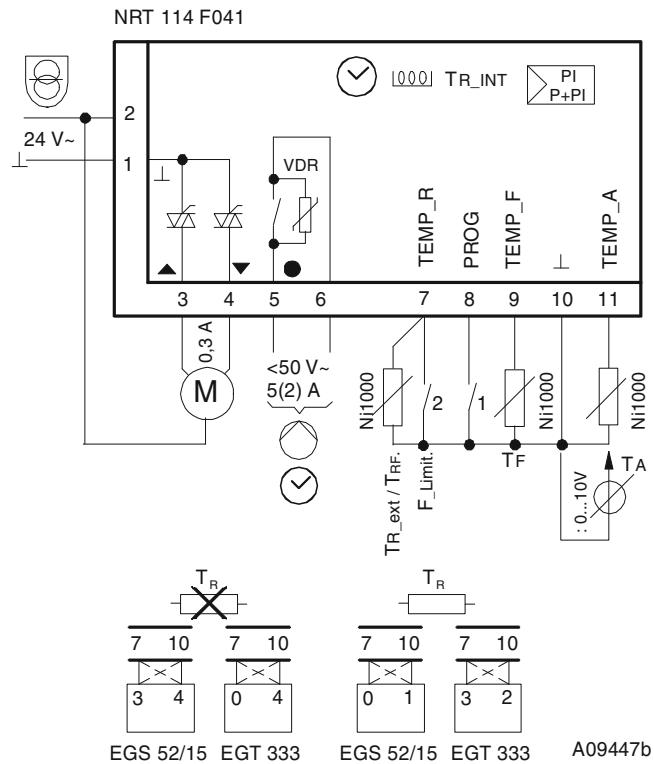


Fig. 10: Wiring-Diagram

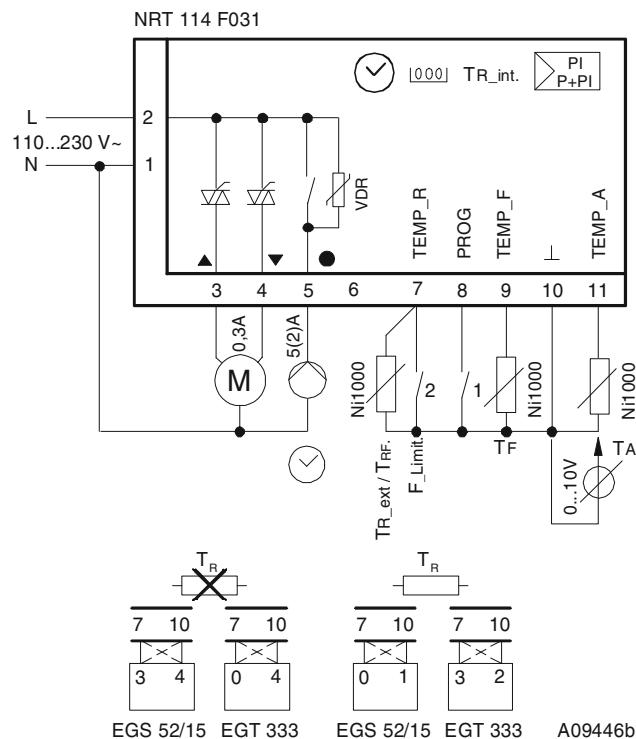


Fig. 11: Wiring-Diagram

i Electronic earth is switched at pins 3 and 4.

14 Dimension drawing

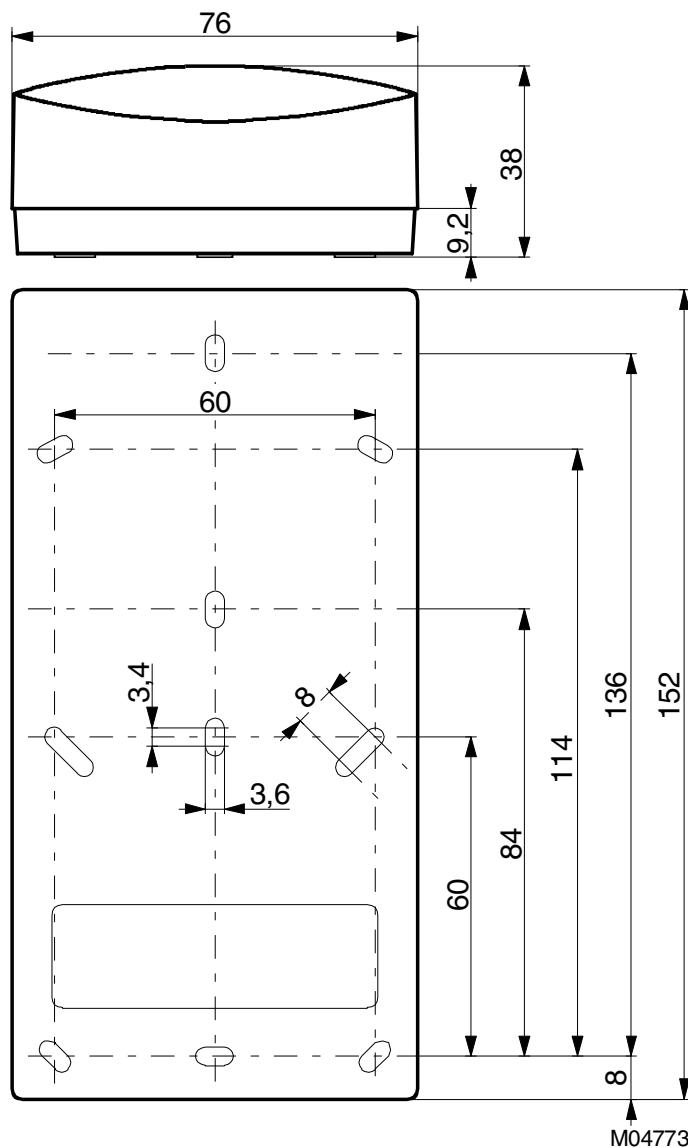


Fig. 12: Dimension drawing NRT 114

15 Technical data

15.1 Overview of technical data

Power supply	NRT 114 F031: 230 V~ NRT 114 F041: 24 V~
Tolerance for power supply	±15%, 50...50 Hz
Power consumption	< 1.5 VA
Ambient temperature	0...50°C
Ambient humidity	5...95%rh (non-condensating)
Storage & transport temperature	-25...+65°C
Conformity	EN 12098 and CE
Degree of protection	IP 30 (EN 60529)
Protection class	II (IEC 536)
EMC irradiation	EN 61000-6-1, 2
EMC immunity	EN 61000-6-3, 4
Safety	EN 60730-1
Weight	0.28 kg
Dimensions (W x H x D)	76 x 152 x 37 mm
Outputs	1 relay, 2 triacs Relay 5 (2) A , triac 0.3 [0.5] ⁶ A, NRT 114 F031: 10 mA NRT 114 F041: 40 mA NRT 114 F031: 230 V~ NRT 114 F041: 24 V~ NRT 114 F031: 230 V~ NRT 114 F041: ≤ 50 V _≥
Inputs	1 binary, 3 analogue Switching current approx. 1 mA 2 Ni1000 1 Ni1000 or 0...10 V ⁷
Time-switch	> 6 h (at 20°C after 1 hour's charging) ± 1 s/d at 20°C

⁶ If internal room-temperature sensor is not active

⁷ 0...10 V equates to a temperature range of -50...+50°C

Heating characteristic for MOD1	Curved, without influence of extraneous heat (see SERVice parameter 29)
Attenuation of outside temperature	Can be set in 10 steps from unattenuated to attenuated for 24 hrs.
Summer/winter heat'g limit	ON = summer → winter; OFF = winter → summer MOD 1: ON when $T_{Aged} \leq T_{Rs}$; OFF when $T_{Aged} \geq T_{Rs} + 1K$ MOD 2: ON when $T_{Ri} \leq T_{Rs} + \frac{1}{2} X_p$; OFF when $T_{Ri} \geq T_{Rs} + \frac{1}{2} X_p + 1K$ MOD 3: ON when $T_{Ri} \leq T_{Rs}$; OFF when $T_{Ri} \geq T_{Rs} + 1K$
Parameters	Non-volatile
Cycle time	1/10 Ty
Temporary temperature change	Change in automatic mode. Change applies till the next switching command, but for at least 2 hours. Change can be aborted.
(Un)limited temperature change	Change in automatic mode. Changes from 3 hours to 19 days are possible. Indication of remaining time in the display. Change can be aborted.
Measurement of room temperature	Internal NTC and/or external Ni1000 sensor
Zero-point correction, influence of wall	Up to $\pm 6 K$ is possible
Measurement of outside temperature	-50°C...+50°C. Jumper permits choice of input signal Ni1000 and 0...10 Volt. Input impedance for 0...10 Volt: 100 kΩ
Measuring accuracy	$\pm 0.2 K$ at 20°C and a Triac current of < 0.3A
Setpoint range for room temperature	8...40°C when room temperature is measured using internal NTC sensor, 8...70°C when room temperature is measured using external Ni1000 sensor
Setpoint gradations for room temperature	0.5 K
Time constant for data processing	< 10 sec for Ni1000 sensor; < 25 sec for NTC sensor

Setting limit for room-temperature setpoint	On the service level, the minimum and maximum setpoints (TR_{smin} , TR_{smax}) for the room temperature can be limited/extended. The factory setting is 8°C...38°C. The furthest setting limit is 8°C...40°C when the room temperature is measured using an internal sensor; 8...70°C is the furthest setting limit when the room temperature is measured using an external sensor.
Keypad lock	Locked and unlocked by a pre-set key sequence; lock is indicated in the display.
Valve outputs	Triac (with indication of switching status)
Pump output	Relay (with indication of switching status) <ul style="list-style-type: none">▪ Switching operations, mechanical▪ Mode of operation > 5 million cycles As per EN 60730: Type 1 C
Hours run counter	Counts when relay's contacts are closed; can be viewed in SERVice mode, but not deleted
Pump follow-on time	On changing from fixed-value control to flow-temperature control as per the switching programme, the pump continues to run for as long as the valve's set running time plus another two minutes.
Flow limitation	When the binary contacts are closed, the valve closes. The valve opens again when $TF_i < TF_s - 5^\circ\text{C}$. After the valve has opened, the binary contacts remain ignored for three times the valve's running time.
Maximum valve opening	Valve's opening time = $1.5 \times$ valve's running time
Neutral zone for MOD 1 and 3	$\pm 1.5 \text{ K}$
Neutral zone for MOD 2	$\pm 0.20 \text{ K}$
Pump standstill time	Time that the pump is switched off after a reduction in the room temperature's setpoint, if the room temperature is not measured. The time can be set in SERVice mode. The factory setting is 120 min
Documentation	
▪ Fitting instructions	NRT 114 F031: MV 505760
▪ Abridged operating instructions	NRT 114 F041: MV 505761
▪ Operating instructions	BA 505740
	7000974

Tab. 6: Overview technical data

15.2 Overview of main functions

Connection of room temperature	In control model 1, any deviation in the actual value of the room temperature from the room temperature's setpoint is corrected. Both positive and negative deviations can be compensated for by raising or lowering the flow temperature. Can be (de-)activated in SERVice mode. Factory setting not active.
	Influence of the room temperature: $\Delta T_F = 3 \cdot (S+1) \cdot (T_{Rs} - T_{Ri})$ where $(T_{Rs} - T_{Ri})$ is included only up to ± 3 K.
Switching programmes	There is a weekly switching programme with a maximum of 42 switching commands and a calendar switching programme with a maximum of six switching commands. A lower temperature level from the weekly and calendar switching programmes has priority. An 'empty' switching programme is interpreted as automatic mode with temperature level T3. On the LCD, the clock symbol appears without Index 1 or 2. The calendar switching programme can be (de-)activated in SERVice mode. In the factory setting, the calendar switching programme is not active.
Summer/winter time-change	Is carried out automatically by the calendar facility on the programmed date (provided it is a Sunday, otherwise on the following Sunday) at either 02:00 hrs or 3:00 hrs. Can be (de-)activated in SERVice mode. The factory setting is active with change-over dates of 25 th October and 25 th March.
Frost protection	Frost-protection function cuts in falls the controller is running in automatic mode and the heating is on stand-by (equates to temperature level T0) or the heating is switched off. In addition, the frost-protection limit must be breached. The frost-protection limit is 3°C for the (attenuated) outside temperature in control model 1 and 8°C for the room temperature in control models 2 and 3. The frost-protection function is de-activated again when the (attenuated) outside temperature rises above 4°C or the room temperature rises above 9°C. When the frost-protection function cuts in, the valve opens 30% and the heating pump switched on (in MOD2). In MOD1 and MOD3, T _F is checked. If T _F < 5°C, the valve is opened 30% and the heating pump switched on. If T _F > 20°C, the valve closes and the heating pump is switched off. The frost-protection function can be (de-)activated in SERVice mode. The factory setting is active.
Anti-jamming facility	If the heating pump or valve are unused for longer than 168 hours, the outputs are activated in sequence on the following Sunday at 00:00 hrs. Can be (de-)activated in SERVice mode; factory setting is 'not active'.
Reset	The controller can be reset by pressing the reset button. The time and date then have to be re-entered. The parameters that were set in SERVice mode and the switching programme remain unaffected.

Fixed-value control	In control models 1 and 3, fixed-value control with the aid of the binary input PROG (see SERVice parameter 17) can be realised. The flow temperature is controlled to a fixed value. This value can be changed in SERVice mode. Fixed-value control has priority over the control of the flow temperature as per the switching programme.
Limitation of flow temperature	In control models 1 and 3, the return temperature can be limited. The limit value for the return temperature and the level of intervention auf the flow temperature can be set in the SERVice mode. On breaching the limit value either way, the level of intervention changes the value of the flow temperature's setpoint in accordance with the amount entered. Whether the limitation is of the minimum or the maximum return temperature depends on the application, i.e. the value assigned to the corresponding SERVice parameter. If the maximum or minimum limit of the return temperature is breached, the setpoint for the flow temperature is adjusted. In summer mode or if the heating is run in stand-by (equates to temperature level T_0) or the heating is switched off, the limitation of the return temperature is not active.
Limitation of return temperature	In control models 1 and 3, the return temperature can be limited. The limit value for the return temperature and the level of intervention auf the flow temperature can be set in the SERVice mode. On breaching the limit value, the level of intervention changes the value of the flow temperature's setpoint in accordance with the amount entered. The level of intervention is set by changing the mathematical prefix (+ or -), i.e. whether the limitation is of the minimum or the maximum return temperature. A positive value limits the maximum return temperature, while a negative value limits the minimum return temperature. If the maximum or minimum limit of the return temperature is breached, the flow temperature is reduced. In summer mode or if the heating is run in stand-by (equates to temperature level T_0) or the heating is switched off, the limitation of the return temperature is not active.
Manual mode	In manual mode, the pump and the valve can be activated separately. Settings are menu-led, if the manual mode has been enabled. The manual mode is enabled in SERVice mode. In the factory setting, manual mode is 'not enabled'.
Pilot timer	The relay output can be configured as a pilot timer signal. Temperature levels T_0 (heating stand-by) and T_1 (reduced temperature) cause the relay contacts to close. T_2 (normal temperature) and T_3 (comfort temperature) cause the contacts to open. The configuration is carried out in SERVice mode, in which the influence of an (un)limited temperature change and of the binary input on the pilot timer signal can be set. The factory setting for the relay output enables a heating pump to be activated.

Floor drying EN 1264 Part 4 describes how cement floors have to be treated before floor coverings are laid (during operational heating). First of all, a flow temperature of 25°C has to be maintained for three days. Then, the maximum flow temperature has to be maintained for a further four days. This function is included in the NRT 114, and is called up via the SERVice mode.

16 Overview of controller settings

16.1 List of SERVice parameters

If the factory setting for the SERVice parameters is changed, enter the changed values in the following table.

Parameter	(Change)	Parameter	
SP01	X.xx	SP22	120
SP02	0	SP23	0
SP03	0	SP24	75
SP04	0	SP25	90
SP05	0	SP26	2
SP06	0	SP27	60
SP07	0	SP28	0
SP08		SP29	1.4
SP09	0	SP30	1
SP10	8	SP31	0
SP11	38	SP32	0
SP12	0	SP33	120
SP13	0.0	SP34	0
SP14	0.0	SP35	0
SP15	0	SP36	10.25
SP16	3	SP37	03.25
SP17	0	SP38	66.3
SP18	0	SP39	69.7
SP19	2.0	SP40	-10.3
SP20	40	SP41	33.4
SP21	240	SP60	0

Tab. 7: List of SERVice parameter

16.2 Weekly switching programme



Day	Time	Temperature level	(Deleted)
Daily	06:00		<input type="checkbox"/>
Daily	15:00		<input type="checkbox"/>
Daily	22:00		<input type="checkbox"/>
Friday	06:00		<input type="checkbox"/>
Friday	15:00		<input type="checkbox"/>
Friday	22:30		<input type="checkbox"/>
Saturday	07:00		<input type="checkbox"/>
Saturday	15:00		<input type="checkbox"/>
Saturday	23:00		<input type="checkbox"/>
Sunday	07:00		<input type="checkbox"/>
Sunday	15:00		<input type="checkbox"/>
Sunday	22:00		<input type="checkbox"/>

Inserted switching commands for the weekly switching programme

16.3 12-month switching programme

Inserted switching commands for the 12-month switching programme

16.4 Temperature steps

Temperature level		(changed to)
T1	17 °C	_____
T2	20 °C	_____
T3	21 °C	_____

Tab. 8: Temperature steps

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Abbreviations

Abbreviation	Term
P	SERVice parameters
S	Slope of heating characteristic
T ₀	Temperature level 0 (heating stand-by)
T ₁	Temperature level 1 (reduced)
T ₂	Temperature level 2 (normal)
T ₃	Temperature level 3 (comfort)
T ₄	Temperature level 4 (fixed value)
T _{Aged}	Attenuated outside temperature
T _F	Supply temperature
T _{Fmax}	Maximum flow temperature
T _{Fs}	Flow temperature setpoint
T _{Ri}	Room temperature's actual value
T _{Rmax}	Maximum limitation setting range T _{Rs}
T _{Rmin}	Minimum limitation setting range T _{Rs}
T _{Rs}	Room temperature's setpoint
T _y	Valve's running time
X _p	Proportional band

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